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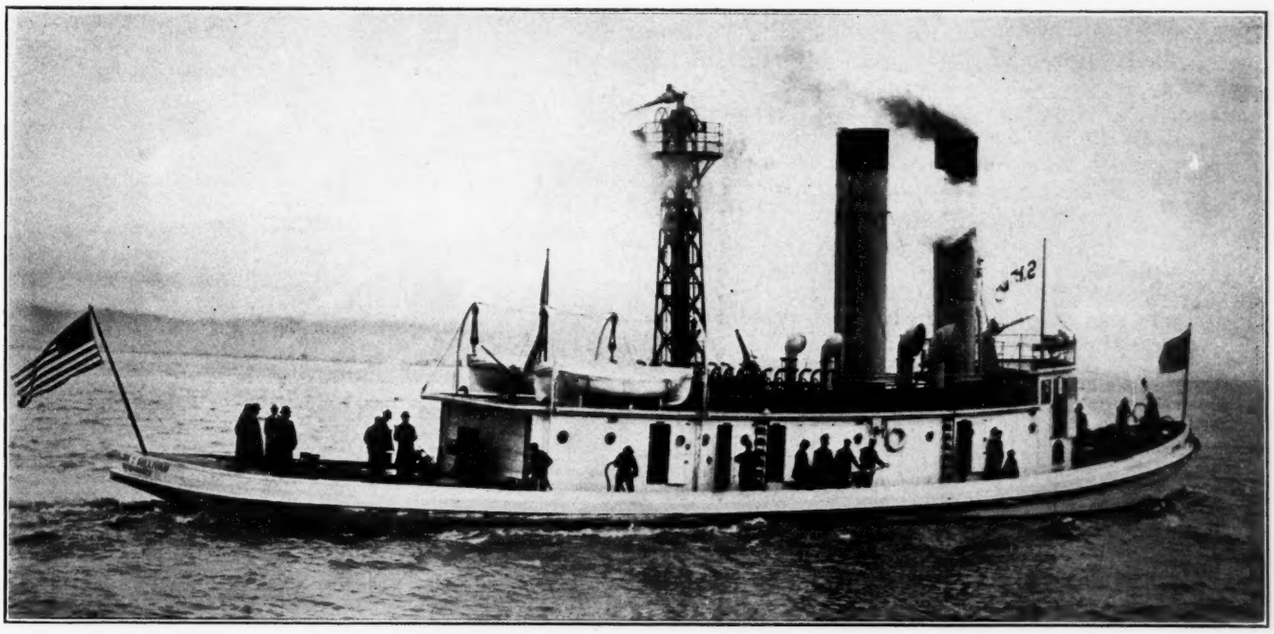


FIRE BOAT "DENNIS T. SULLIVAN" OF SAN FRANCISCO.

FIRE BOATS OF AMERICAN CITIES

For Water Front Protection and High Pressure Service.—Steam Turbines and Centrifugal Pumps.—Descriptions of Boats in Use at San Francisco, Chicago, Duluth, New York, Boston and Seattle.

By WILLIAM E. PATTERSON.

The modern fire boat has become a necessary adjunct to the fire departments of both inland and seaboard cities where there are large investments in ships, wharfage, warehouses and other property on the water front. Where facilities exist for connecting the high pressure pumps of the fire boats to city water mains, their sphere of usefulness is not limited to the immediate vicinity of the water fronts, and they have been found in many instances to be valuable auxiliaries to the land fire fighting apparatus.

The practical value of a fire boat is largely dependent on the volume of pressure of the water which can be delivered by the pumping outfit. Heretofore the usual equipment has consisted of double cylinder, vertical, inverted reciprocating pumps, each unit having a capacity of about 3,000 gallons per minute, but the higher steam pressures now demanded in fire boat service can be most economically and safely obtained by the use of centrifugal pumps driven by steam turbines. This combination, when compared with reciprocating pump equipments ordinarily used in fire boats, has the following advantages:

It shows a marked improvement in steam economy for a given amount of water delivered at the nozzles, together with a practical elimination of the strain on the hull, due to vibration which is inseparable from the use of reciprocating pumps.

The absence of valves and other moving parts required in the reciprocating pump minimizes the cost of attendance and the replacement of worn parts. The two-stage turbine-driven centrifugal pumps now in use can deliver water at higher pressure than the reciprocating pumps heretofore used, and the pressure can readily be increased by adding to the number of stages or by running centrifugal pumps in tandem without affecting the structure or general efficiency of the pumping equipment.

In order to obtain a maximum output with centrifugal pumps, high peripheral speed is necessary. The characteristics of the steam turbine make it especially valuable for this work, as it also is most efficient at speeds that are much higher than those obtained with any form of reciprocating engine.

At present seven boats equipped with Curtis steam turbine-driven centrifugal multi-stage pumps are in commission as follows: Two in New York City, two in

Chicago, two in San Francisco and one in Duluth, Minn., which was constructed for the Duluth, Missabe and Northern Railway.

DULUTH FIRE BOAT.

The powerful fire boat "William A. McGonagle," belonging to the Duluth, Missabe and Northern Railway, was built to protect the great iron ore docks at Duluth, Minn., and its pumps can deliver 12,000 gallons of water per minute at a pressure of 150 pounds under normal operating conditions.

The general dimensions of the boat are: Length over all, 120 ft.; beam moulded, 28 ft.; depth moulded, 15 ft. The boat is heavily constructed and is propelled by a single screw driven by a double vertical high pressure engine having two cylinders, each 20 inches in diameter by 24-inch stroke. Steam at a working pressure of 180 pounds is supplied by two Scotch boilers 13 ft. 9 in. in diameter by 11 ft. 6 in. long. There are three main turret nozzles, one mounted on the main deck forwarded, one on the top of the pilot house and the third on the top of the deck house aft. In addition to these, there are twelve valves for the auxiliary fire streams distributed along the sides of the deck house.

The pumping equipment consists of two sets of two-stage centrifugal pumps each driven by an 800 h. p horizontal shaft Curtis steam turbine; each pumping set, when supplied with steam at a pressure of 180 pounds per square inch and operating with 28 inches of vacuum, delivering 6,000 gallons per minute at a pressure of 150 pounds. These two sets can be operated in series to obtain double pressure and are tested for a pressure of 300 pounds per square inch. The pumps and turbines are direct connected and are mounted on a common base, their normal speed being 1,800 r. p. m The turbines are provided with both automatic and hand controlled governors and a relief valve is also supplied to prevent injury in the event of a failure to maintain the vacuum. The guarantee on the pumping equipment called for a steam consumption of 30,000 pounds per hour when the sets were operating at their full capacity as rated, but during the exhaustive tests to which the boat was subjected before being accepted, it was demonstrated that the actual steam consumption under these conditions amounted to only 25,880 pounds per hour.

Electricity is employed to light the boat, and a powerful search light is located on the top of the pilot house current being supplied by a 10 k. w. marine generator set of the General Electric manufacture.

SAN FRANCISCO'S BOATS.

The fire boats "David Scannel" and "Dennis T. Sullivan," of San Francisco, were built by the Risdon Iron Works from designs prepared by Marsden Manson, civil engineer, of San Francisco, and these two boats differ somewhat from that of the Duluth boat in that each turbine is direct connected through flexible couplings to two multi-stage centrifugal pumps, all three units of each set being mounted on a common bed-plate. Two of these sets are required for each boat.

Each pump of each set is capable of delivering 2,250 gallons of water per minute against a discharge pressure of 150 pounds per square inch, the two pumps of each unit being so designed that they may be operated either in parallel or in series. When operating in parallel they deliver 4,500 gallons per minute at 150 pounds pressure, and when operated in series 2,250 gallons per minute at 300 pounds pressure. These ratings apply when the suction head is zero. The steam turbines used on these boats were built by the General Electric Company and are of the same type as those built for the Duluth boat. They operate under a steam pressure of 150 pounds per square inch, and exhaust into a condenser in which a vacuum of approximately 26 inches is maintained.

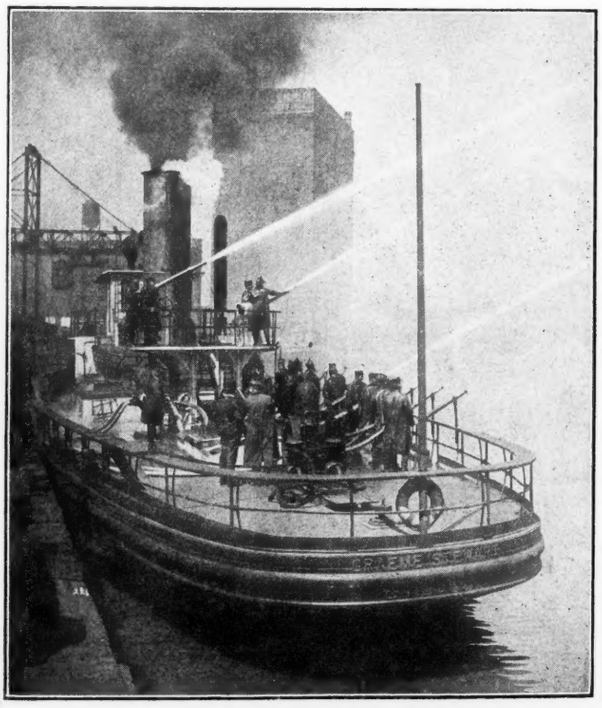
In order to insure safety in operation the turbines are provided with an automatic governor driven through positive gears from the turbine shaft. This governor is fitted with a spring which may be adjusted by hand while the turbine is running, and in this way the speed can be reduced to at least 75 per cent of the normal without interrupting the operation of the turbine. In case the turbine speed increases 20 per cent above normal the throttle valve immediately closes and the turbine is brought to a stop.

In view of the heavy service required of these pumping sets and the limited space available in the hull, they were designed and constructed with special reference to making all parts accessible for overhauling, or for emergency repairs. To insure an ample factor of safety, all parts of both pumps and turbines that are subject to internal pressure were tested with water to twice their working pressure.

The general dimensions of the boats are: Length over all, 129 ft.; beam, 26 ft.; depth, 12 ft. 9 in. They are equipped with three main, mechanically controlled turret nozzles, one located above the pilot house, one midship above the deck house, and the third on a structural steel water tower, a square latticed column, about 26 feet high above the upper deck. It is four feet square at the base and two feet square at the top, and is built of 3½x3½-inch 8.5-pound angles at the corners and cross latticed with 2-inch bars and gussets. The corner angles are carried down to the main deck and well secured to the thwart ship bulkheads in the deck house. A platform about 7 feet in diameter is fitted about 2 feet below the top of the tower.

FIRE BOATS OF CHICAGO.

These were the first centrifugal pump fire boats to be used on the great lakes and the result of their test was watched with much interest. The general dimensions of these boats—the "Joseph Medill" and "Graeme Stewart"—are: Length over all, 120 ft.; length of keel 109 ft. 6 in.; beam, 28 ft.; depth, 15 ft.; displacement, 500 tons; draught, 9 ft. 6 ins. mean.



CHICAGO FIRE BOAT "GRAEME STEWART."

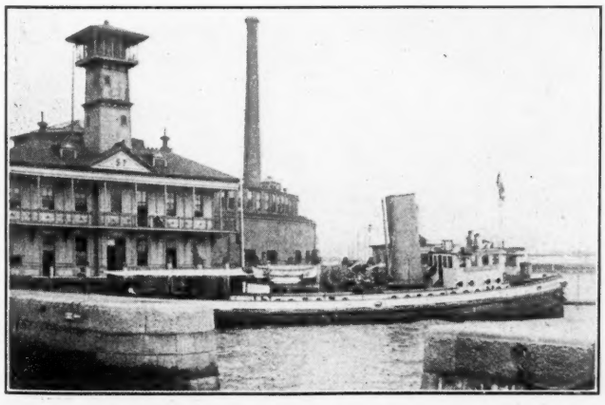
The main pumping and power machinery consists of two 660 horsepower Curtis turbines direct connected to 200 k. w. direct current generators and two-stage centrifugal pumps. The generators serve to provide current for the propelling motors, which are of the variable speed reversing type. In going to a fire the pump impellers run dry. Control of these motors is possible from both the pilot house and engine room, and in the test the captain easily handled his boat without the aid of the engineer. There are two pumping generating sets in each boat, and the boats are furnished with twin screws. Steam is supplied by two two-furnace Scotch boilers, 11 ft. 6 in. long by 12 ft. 6 in. diameter; 1,910 sq. ft. heating surface in each boiler and 42 sq. ft. of grate surface. Forced draught is provided on the closed stoke-hole system.

In the Chicago river, where these boats are being used, the most of the old center pier bridges have been removed and it is necessary at times for a fire boat to maintain itself in the middle of the river while in service at a large fire. On this account mooring spuds were adopted, operated by steam raising and lowering gear.

Because of the unusual character of propelling machinery, some items in connection with the trial trip performances may be of interest. The boat was run over a course from the Manitowoc breakwater to a point opposite the breakwater at Two Rivers, Wisconsin. The two breakwaters are very nearly parallel, and the course as measured from Government charts is five and one-half miles. The time of start and finish was taken, and readings of r. p. m. and switchboard were taken at five minute intervals. The result follows:

Date, October 30, 1908.

Distance	5½ Miles.
Time-mean of two runs	28.25 Min.
Speed—Statute miles per hour	11.7
R. p. m., starboard motor	179
R. p. m., port motor	178
Developed horsepower—	
Motors starboard	166
Motors port	203
Output of generators, starboard	181
Output of generators, port	223
Motor efficiency, starboard	91.0%
Motor efficiency, port	91.8%



NEW YORK FIRE BOAT HEADQUARTERS AT BATTERY PARK AND FIRE BOAT "NEW YORKER."

The principal water outlets consist of two monitor nozzles placed on a platform directly above turrets on which are the hose connections. The pumps, though usually run singly, can be compounded and a nozzle pressure of over 300 pounds was obtained on the official test of these boats with a resultant capacity of about 5,000 gallons per minute.

The data obtained from the 8-hour endurance test which these boats were put through show not only that the centrifugal pumps are a more powerful and reliable machine than the old type, but also that the greater economy of the turbine outfit makes it possible to do more work with about half the boiler capacity. Comparing the water rate of these turbines with that of a high pressure pump taking steam for almost full strokes demonstrated the fact that there is probably no boat afloat of the same size that has the pumping capacity of the Joseph Medill. While the guaranteed capacity of the boat was 9,000 gallons per minute, the eight hour endurance test showed an average delivery of 9,600 gallons. As may be surmised, the builders ran the test with the idea of fulfilling their contract and not to make a record. It is safe to say that this boat, if crowded, will deliver between 10,000 and 11,000 gallons of water per minute at 150 pounds pressure.

NEW YORK CITY'S FIRE BOATS.

The marine battalion, composed of the fire boats of the Greater New York Fire Department, and officially known as Battalion No. 19, are under the command of a battalion chief, who is responsible for the protection of the Port of New York from fire. By an amendment to the city charter, these boats can operate on the New Jersey side of the river, the jurisdiction of the port extending from low water mark. This was made possible by the Legislature after the terrible destruction of shipping, piers, warehouses and human lives at Hoboken, N. J., on June 30, 1900, which started on the piers of the North German Lloyd Steamship Co., causing a loss of millions of dollars' worth of property. The crews of the fire boats of course are not permitted to land and operate in the State of New Jersey, but have full right to work on any fire from the water. The amount of territory subject to the fire boats' jurisdiction, including all of the indentations and windings of the various creeks, rivers, canals and the spaces occupied by the ferries, wharves, piers and the like, is close upon if it does not exceed 600 miles. Any ship in the harbor, inside or outside of the Narrows, is entitled to claim the assistance of a fire boat when the emergency arises. The value of property that has to be protected runs up into the billions of dollars, and calls for constant watchfulness on the part of the fire boat crews.

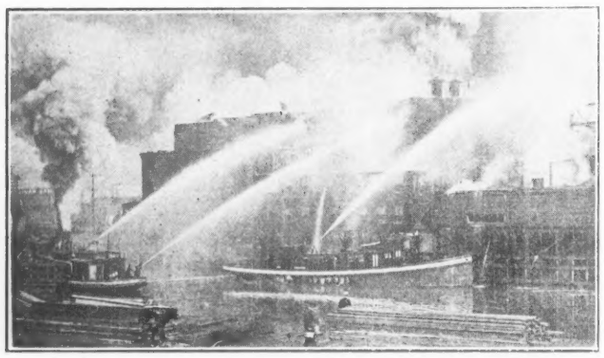
The battalion chief in command of the fire boat battalion attends all first alarms up to Catharine street on the East river, and as far up as 65th street on the Hudson river—second alarms only when the fires are farther north. The chief as a general thing usually attends all fires in his steam launch "Velox," which is a familiar sight in the harbor, and issues all his orders from her. A blue light in the rigging indicates her whereabouts at night. In case of an unusually bad fire, the blue light is transferred to the "New Yorker" (Engine 57). He directs the operations of the firemen by means of whistles and a specially drawn up code of signals. During the day he attends to his inspection work and any other urgent business and to second alarms only.

The fire boats and their crews were formerly under the command and direction of engine company commanders at fires, but were organized into a separate battalion and put under the command of a battalion chief in January, 1905, which change has greatly increased their efficiency.

Few people outside of the Fire Department of Brooklyn knew of the great danger that threatened Brooklyn by fire on the night of November 23, and the early morning of November 24, 1891. This was during the time the water supply was entirely cut off from the city owing to a break in the water main. Shortly before midnight an alarm of fire came in from Court street for a fire in the middle of a crowded block of stores between Harrison and DeGraw streets. A third alarm was sent

out immediately after the arrival of the Fire Department, but the apparatus was of little or no use owing to the lack of water. It was then that the utility of the fire boat was demonstrated. Steaming to the foot of Irving street, two lines of hose, each 3,600 feet in length were stretched in from the "Seth Low," water being taken from Buttermilk Channel. The fire boat lay nearly 4,000 feet from the fire, which was 200 feet above the level of the river. While the flames were at their height an alarm came in from Union street, where a paper factory was in flames. Three steamers dropped their suctions into the river, and 1,000 feet of hose was stretched in from the "Seth Low," making in all 8,200 feet of hose through which the fire boat's pumps were delivering water. No such amount of work was expected from them, but the firemen were conscious of the danger that confronted them and put on all that the pumps would stand. The result proved a complete triumph for the fire boat, and saved Brooklyn from a terrible holocaust.

The fire boat battalion of the New York Fire Department comprises a fleet of 10 modern fire boats in service at the present time, in addition to the new boat now under construction, the William J. Gaynor. A complete description of same is given below:



CLEVELAND FIRE BOATS IN ACTION.

The new fire boat "William J. Gaynor," launched June 6, 1913, and now under construction by the John W Sullivan Co., New York, is of steel, single screw propelling type, 120 feet over all, 109 feet on water line, 25 feet beam moulded and 14 feet depth moulded, designed by J. W. Miliard & Brother, and under whose supervision she is being constructed. The main features of the hull are the clear, open deck space, allowing plenty of room when going into action, the high water tower mast aft, good freeboard, and the quick manoeuvring qualities of the hull. The propelling engine is of the two-cylinder, compound, inverted, direct acting type. The cylinders are 18 and 38 inches diameter working bore; stroke, 26 inches. There are two Babcock & Wilcox water tube boilers, one separate surface condenser, independent circulating air, feed, donkey, sanitary and fresh water pumps, two steam turbine driven centrifugal fire pumps, dynamo, steam steering engine, forced draft blower, etc. The propeller wheel is four-bladed two screw, eighth handed, solid, made of open hearth cast steel. There are two fire pumping units on the boat of the horizontal shaft, two-stage centrifugal type, of special high-speed design, direct connected to a 500 h. p impulse type steam turbine built by the Alberger Pump & Condenser Co., New York. Each unit is guaranteed to deliver 3,500 gallons of salt water per minute against a pressure of 175 pounds per square inch, when operating at a speed of 1,800 revolutions per minute, and when the steam turbine is supplied with 9,500 pounds of dry steam per hour at 200 pounds gauge pressure, and exhausting into a condenser, with a vacuum equal to 26 inches of mercury. Each turbine is of the impulse type. Turbine and pump are mounted on a common bed plate of substantial design. There are four turret nozzles one on top of the pilot house, one over each water turret, and one on the water tower, and provisions are made so that the nigger-head forward can be utilized as a siamese nozzle. The two water turrets on the main deck each have nine 3½-inch outlets, each outlet fitted with a brass gate valve and hose connection with a brass cap slotted for spanners and secured with brass ring and chain. A 6-inch copper pipe controlled by a gate valve is fitted from the top of each water turret to supply the turret nozzle above it, so that the man operating it can have plenty of room without interfering with the working of the turret nozzles. The two Babcock & Wilcox boilers are placed in the vessel side by side, athwartships, and fired from forward to aft, each boiler having not less than 1,800 square feet of heating surface, and not less than 50 square feet of grate surface. The working pressure will be 200 pounds per square inch above the atmosphere. These boilers have a combined output of dry steam of not less than 22,000 pounds per hour at 200 pounds boiler pressure, when working in a closed stokehole under a draft pressure in the ash pit not exceeding one inch of water, and when burning egg-size anthracite coal. The boat has a steam steering engine,

NAMES AND DESCRIPTIONS OF NEW YORK'S TEN BOATS.

Name and No. of Boat.	When built.	Length. ft.-in.	Beam. ft. in.	Draught. ft. in.	Kind of hull.	Tonnage.	Capacity galls. H.P.	per min.
Zopher Mills (Eng. 51)	1882	120.5	25	10	steel	185.	550	6,000
New Yorker (Eng. 57)	1891	125.6	26.11	12	steel	243.38	750	12,000
Wm. L. Strong (Eng. 66)	1897	110	24	12.6	steel	203	350	6,000
Abram S. Hewitt (Eng. 77)	1903	117.0	25	10.6	steel	223	450	7,000
Geo. B. McClelland (Eng. 78)	1904	117.0	24	9.6	steel	256	500	7,000
*James Duane (Eng. 85)	1907	131	28	10.6	steel	326	900	9,000
*Thomas Willett (Eng. 86)	1907	131	28	10.6	steel	326	900	9,000
Cornelius W. Lawrence (Eng. 87)	1907	104.6	23.6	9	steel	172	500	7,000
Seth Low (Eng. 123)	1885	99.3	23.9	9.6		82	240	3,500
David A. Boody (Eng. 132)	1892	105	23	9.6		94	240	5,000

*Equipped with centrifugal pumps.

Table Showing the Manual Force of Battalion No. 19 and Amount of Service Performed from Jan. 1 to Dec. 31, 1912:

Name and No. of Fire Boat.	Alarms answered.	Actual times in service.	Captains.	Lieutenants.	Engineers.	Marine engineers.	Pilots.	Firemen.
Zopher Mills (Eng. 51)	78	3	1	1	2	—	4	12
New Yorker (Eng. 57)	374	21	1	1	4	1	2	11
Wm. L. Strong (Eng. 66)	200	21	1	2	8	—	3	17
Abram S. Hewitt (Eng. 77)	175	6	1	1	4	2	1	12
G. B. McClelland (Eng. 78)	276	14	1	1	5	—	2	17
James Duane (Eng. 85)	165	21	1	2	5	—	1	10
Thomas Willett (Eng. 86)	235	27	1	1	4	—	2	13
C. B. Lawrence (Eng. 87)	268	8	1	2	7	2	2	14
Seth Low (Eng. 123)	85	13	1	1	4	—	2	9
Dav. A. Boody (Eng. 132)	322	24	1	1	3	1	1	11

the electric installation consisting of a 10 k. w. direct connected generating set, and an 18-inch searchlight mounted on top of the pilot house.

As is usual on the New York fire boats, there will be no sleeping and living quarters for the firemen on board with the exception of the engineers, who are always ready, and who have a large stateroom with berths directly off the engine room provided for their use. There is a cabin forward fitted with steel lockers for the men's clothes, but the crew are quartered on the shore near the boat, which lies moored to the wharf, steam up, always ready for action. The boat will have sufficient boiler power to run the fire-pumping equipment and the main engines at the same time, and will make about fifteen miles an hour.

NEW BOSTON FIRE BOAT.

Boston's fire boat Engine 47, built in 1910, is one of the fastest, most powerful and efficient vessels ever built for fire service in America. Her characteristic features were adopted only after a careful consideration of the needs of the water front of the city and a study of the latest types of such vessels built or building for other cities.

In Boston the number of places demanding protection where the depth of water is limited requires a boat of light draft. The number of drawbridges that have to be passed through, and the presence of heavy ice in the winter season, necessitate a hull of substantial construction to withstand the severe service to which the boat must be subjected. It was with these conditions in mind that it was decided to build the hull of wood instead of steel. A wooden hull has greater local strength than the thinly plated steel vessel, making it much better adapted to withstand rough treatment at the drawbridges and wharves and in the ice. Being sheathed with copper over the whole immersed portion of the hull, it also keeps clean indefinitely, while a steel hull would soon foul up in the waters of the harbor. The life of a steel hull would also be very short in service as a Boston fire boat, for the reason that, in touching the first shoal place, the paint on the bottom would be scraped off and the erosive action of the sea water on the mild steel would be rapidly destructive.

The principal dimensions of the hull are as follows:

Length over all	113 feet 9 inches
Beam over plank	26 feet 0 inches
Depth	11 feet ½ inch
Draft, fully loaded	9 feet 0 inches

The keel, stem, propeller and rudder posts, rudder outboard plank, frames, guards and rails are of white oak. The beams, keelsons, ceiling and clamps are of yellow pine, and the deck planks are of Oregon fir. The main deck house is of steel, and the pilot house of wood, the latter being thoroughly fitted with sprinkling arrangements piped to the fire service pipe and fitted with valves for regulation. The entire bottom of the boat is sheathed with copper.

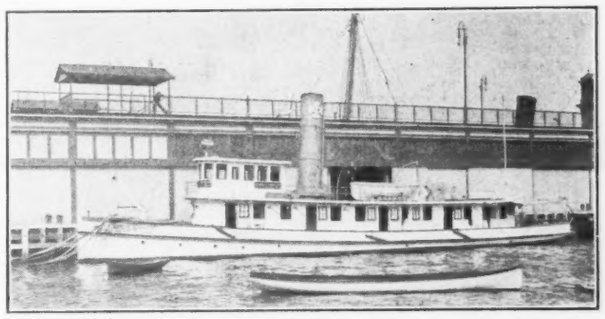
As the boat must operate on salt water and be independent of any fresh water supply for feeding boilers the design of the machinery becomes much more complicated than for cities like Buffalo, Chicago and Detroit, where the feed water is pumped from the lake or river directly into the boilers and no condensing apparatus is necessary. The main engines are of the vertical inverted compound type, cylinders 17 and 36 inches diameter, stroke 24 inches. It is fitted with steam reversing gear. The propeller is four-bladed, of the "built up" type and is entirely of bronze. It is 8 ft. diameter and 11 feet 6 inches pitch.

The fire pumps, two in number, are of the vertical, tandem compound, duplex flywheel type. The steam cylinders are 12 and 22 inches in diameter, the water cylinders are 10 inches diameter, the stroke of all being 11 inches. They are designed for a combined capacity of 6,000 gallons of water per minute, with a pressure of 175 pounds per square inch at the pumps.

One surface condenser is used for condensing all the exhaust steam, so that it may be pumped back into the boilers. There are a vertical twin air pump, a centrifugal circulating pump, two feed pumps, a bilge pump, two boiler circulating pumps and a sanitary pump. There is an electric generating plant of 7½ kilowatts capacity, sufficient to thoroughly light the boat, and also furnish current for a powerful searchlight. There is a steam steerer of the Hyde type, operated by a small hand wheel in the pilot house.

The two boilers are of the Scotch type, two in number 11 ft. in diameter and 10 ft. 9 ins. long, built for a working pressure of 140 pounds per square inch. Each has two Morrison suspension furnaces 42 inches least internal diameter. The boilers are connected by breeching with a common double smokestack. Forced draft is provided by the closed ash-pit system, the blower being located in the fire room on the port side and discharging through ducts under the fire room floor into the furnaces below the grates. Dampers are provided for shutting the air off each furnace and for regulation.

There are 12 outlets for 3½-inch hose for use at fires some distances from the water front. Three thousand feet of hose are carried. Five deck turret nozzles, two on the forward deck, one on the pilot house, one on the main deck house and one at the top of the smokestack, are all worked by means of hand wheels, so that one man can easily handle them when working at any pressure.



PHILADELPHIA FIRE BOAT "EDWIN S. STUART" CONNECTED UP TO HIGH PRESSURE PIPE LINE.

The use of the smokestack as a water tower is unique, no other boat ever having been fitted up in this manner. It is expected to be particularly valuable for reaching fires by playing over buildings or high piles of lumber that could not be reached in any other way.

The boat was designed by William T. Keough, consulting engineer and naval architect, and has been built under the supervision of Superintendent Eugene M. Byington of the Boston Fire Department repair shop.

NEW FIREBOAT AT SEATTLE.

The "Duwamish," Seattle's new fireboat, which cost, exclusive of hose, $122,400, is constructed of steel throughout, of the flush-deck type, with a low trunk extending fore and aft 55 feet for ventilation, and secondarily to accommodate piping. The trunk can be ascended without the use of ladders or steps. The stern is of the torpedo-boat style, giving increased water line length and more protection to the twin propellers. The after-end as far as the orlop deck is built as a double bottom, with a capacity of 9,000 gallons of fresh water. The fuel oil tank, located in the forward hold of the vessel, will hold 277 barrels. The "Duwamish" is

120 feet over all, 28 feet beam, 15 feet depth of hold, 8 feet load draft, and 450 tons displacement. As the firemen do not live on the boat, no quarters are reserved for them, except a bathroom and steam galley for use at fires of long duration.

There are three duplex flywheel pumps, with cylinders 17 inches in diameter, plungers 10 inches in diameter by 11 inches stroke, designed for a working anchorage pressure of water at 200 pounds per square inch, or a total of 9,000 gallons per minute. As salt water mains may be installed at some future time in the business district, a discharge opening is provided for. A 12-inch emergency suction opening is also provided for the pumps, to which suction hose may be coupled when pumping out other craft.

There are twin 16-inch injection valves to supply the three pumps. The discharge is connected to two 14-inch mains running to the monitor on top of the pilot house, which has nozzle tips from 4½ inches to 5½ inches in diameter. Two 12-inch mains also run from the pumps to the companion deck aft to another monitor, with nozzle tips of from 3½ to 4 inches in diameter. There are also two connections for 3½-inch hose arranged on either side of the stern, while the 12 and 14-inch fire mains encircle the boat.

The main propelling engines are of the double vertical inverted type, each having two cylinders 14 inches in diameter by 16 inches stroke. Each engine will develop 450 horsepower, with steam at 150 pounds. The twin propellers are of the four-bladed, built-up type, 6 feet in diameter by 8 feet pitch. Four Mosher water-tube boilers, each 2,250 square feet of heating surface, are provided. The electric light plant consists of 10-kilowatt turbine-driven generator, and a 15-inch searchlight is mounted on the pilot house, which is operated from the inside. Her speed in answering an alarm averages 14 miles an hour. At a test the three pumps were run at a speed of from 220 to 232 revolutions per minute, discharging from 9,000 to 9,500 gallons per minute at 180 to 195 pounds pressure at the pumps. Under service conditions, nozzle pressure of 150 pounds would probably not be reached, and at the usual fire-station pressure of 100 to 115 pounds the boat should be capable of service of long duration at 10,000 gallons per minute.

NAMES AND DESCRIPTIONS OF BOATS IN TEN CITIES.

City.	Name of Fireboat.	When built	Hull.			Capacity of pumps, gallons per min.
			Kind.	Length.	Width.	
Philadelphia	William Stokley	1884	Steel	96′	17′	2,000
Philadelphia	Samuel G. King	1886	Steel	80′	18′	1,250
Philadelphia	Samuel H. Ashbridge	1901	Steel	65′	19′	1,200
Philadelphia	Edwin S. Stuart	1892	Steel	110′	23′ 6″	9,000
Chicago	Chicago	1887	Wood	90′	20′	2,500
Chicago	D. J. Swenie	1892	Wood	105′	24′ 6″	5,400
Chicago	Michael W. Conway	1890	Wood	106′	25′	6,500
Chicago	Illinois	1899	Steel	118′	25′	10,000
Boston	Engine 31	1889	Wood	108′	24′ 6″	4,790
Boston	Engine 44	1895	Wood	110′	26′	6,420
Buffalo	Geo. R. Potter (Eng. 29)	1887	Steel	80′	20′	4,000
Buffalo	John M. Hutchinson (Eng. 23)	1893	Wood	80′	20′	5,000
Buffalo	W. S. Grattan (Eng. 20)	1900	Steel	113′	24′	9,000
Milwaukee	Cataract	1889	Wood	106′	24′ 9″	5,000
Milwaukee	James Foley	1893	Wood	107′	24′	5,000
Milwaukee	August Jansen	1897	Wood	107′	26′	5,000
Milwaukee	Engine 15	1904	Steel	118′	26′	9,000
Cleveland	Clevelander (Eng. 15)	1886	Wood	79′	22′ 8″	3,800
Cleveland	J. H. Farley (Eng. 21)	1894	Wood	90′	22′	4,000
Detroit	Detroiter (Eng. 25)	1893	Steel	122′	25′	5,000
Detroit	James Battle (Eng. 16)	1901	Steel	122′	25′	6,000
Baltimore	Cataract (Eng. 16)	1901	Wood	86′	20′	4,400
Baltimore	Deluge	1910	Steel	120′	28′	12,000
Portland, Ore.	Geo. H. Williams	1904	Wood	115′	25′	6,000
Portland, Ore.	David Campbell	1913	Steel	...	...	...
Seattle	Snoqualmie	1891	Wood	96′	22′	5,500

COMPARATIVE COST OF AUTOMOBILES AND HORSES

Figures from Forty-Six Cities Giving Actual Cost of Maintenance During the Past Year.—Salaries, Upkeep, Repairs, Supplies.—Autos in Every Case Cheaper than Horse-Drawn Apparatus.

ELYRIA, OHIO.

The following is from special report to Director of Public Safety by W. N. Bates, chief of fire department:

The Elyria, Ohio, fire department is composed of three engine companies and one truck company, as follows:

Engine Co. No. 1 is composed of a captain, lieutenant, master mechanic and three firemen. The apparatus consists of a Robinson auto combination pumping engine and hose wagon, carrying 1,000 feet of 2½-inch hose, four hand extinguishers, extension and roof ladders, and complete minor equipment; also a piston pump having a displacement of 809 gallons at 300 revolutions per minute and maximum speed of 30 miles per hour.

Engine Co. No. 2 is composed of a captain, lieutenant, two engineers and four firemen. The apparatus consists of a Seagrave combination chemical and hose wagon, carrying 1,000 feet of 2½-inch hose, two hand extinguishers, one 40-gallon chemical tank, extension and roof ladders and complete minor equipment, and drawn by two horses; also an Amoskeag steam fire engine, piston pump having a displacement of 624 gallons at 300 revolutions per minute, and drawn by two horses.

Engine Co. No. 3 is composed of a captain, lieutenant and three firemen; otherwise it is an exact duplicate of Engine Co. No. 1.

Hook and Ladder Co. No. 1 is equipped with a Seagrave 65-foot aerial with a paid driver and crew of four volunteer firemen, and drawn by two horses.

Salaries.—With no consideration given to days off or meal hours while working on a fire, Engine Co. No. 1 would have one operator at the machine and five men at the nozzles; Engine Co. No. 2 would have two drivers caring for their horses, two engineers running the engine and four men on the nozzles; and Engine Co. No. 3 would have one operator at the machine and four men at the nozzles.

Therefore it is evident that Engine Co. No. 2 with eight men can place no more men on the nozzles than Engine Co. No. 3 with only five men.

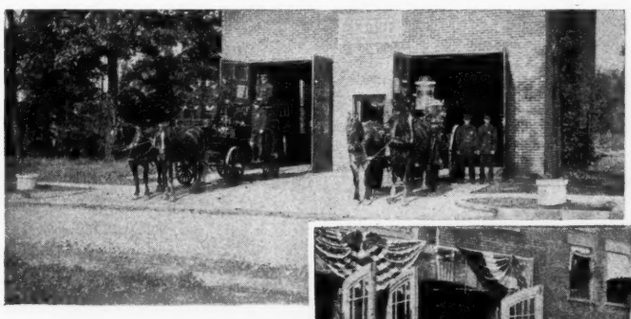
A comparison of the salaries of these two companies is as follows:

Engine Co. No. 2.

1 Captain at $80 per month	$80.00	
1 Lieutenant at $77.50 per month	77.50	
2 Engineers at $80 per month	160.00	
4 Firemen at $75 per month	300.00	
		$617.50

Engine Co. No. 3.

1 Captain at $80 per month	$80.00	
1 Lieutenant at $77.50 per month	77.50	
3 Firemen at $75 each per month	225.00	
		$382.50
Difference in salaries per month		$235.00
Difference in salaries for one year		$2,820.00



Seagrave Combination Chemical and Hose, and Amoskeag Steam Fire Engine.

Robinson Jumbo Pumping Engine and Overland Chief's Car.

Upkeep.—The maintenance of harness and keep of two horses for three months and twenty-seven days and of seven horses for twelve months was $1,122.44, or, per day, about $3.08, or, per day per horse, 40 cents. This I consider a very low figure, which could be affected greatly both by sickness and the high cost of feed.*

Supplies used by the automobile and charged to the Supply Fund, and comparing as nearly as possible to the keep of horses, was as follows:

Gasoline, 670 gallons	$70.35
Lubricating oil, 98 gallons	34.30
Grease, 102 lbs.	9.18
Miscellaneous supplies	17.39
	$131.22
Credit for two returned oil bbls.	1.70
Total	129.52
Or for both machines per day about	.36

As the two automobiles are easily doing the work of ten horses, the saving is readily perceivable.

Repairs.—Extraordinary repairs (painting and varnishing old No. 1, now No. 2, wagon) were $44.00; the ordinary repairs on one combination wagon, one steam fire engine, one hook and ladder truck and two exercise wagons were $108.62; the repairs on the two automobiles for the year were $54.73.

The following apparatus was purchased for the automobiles during the year: (This equipment will last indefinitely and can be used for any number of cars.)

Hydrometer outfit (an outfit for determining the specific gravity of the electrolite in the ignition and light batteries)	$2.50
Volt meter and ammeter	6.25
Special wrench for pump valves	2.50
2 pairs (4) extra heavy skid chains	36.00
(Weed chains came with these machines but it was found they were not strong enough.)	
Rectifier for charging storage batteries	35.00
(The four batteries on our cars were charged 36 times during the year, which, if figured at .50 each, the price charged by the garage, means a saving of $18.00)	
An oil filter for reclaiming lubricating oil that is drained from the crank cases was purchased for	20.00
(The number of gallons of oil taken from the filter during 1912 was 114 gallons. Had it not been for the filter, 114 gallons more of new oil would have been purchased at a price of .35 per gallon or $39.90, showing that the filter has already paid for itself.)	

Although no figure can be given at this time comparing the cost of repairs to stations in which only automobiles are kept with those in which horses are kept, yet there is no doubt there will be a big saving in favor of automobiles. We know that floors and stalls wear out rapidly, especially in the winter, when the horses are sharp shod.

The total expense of the whole year for supplies, repairs, filter, rectifier and all other things for the two machines was only $286.50, while the expense for keep of horses and harness alone was $1,122.44.

Therefore it can readily be seen that, comparing an engine company provided with a combination chemical and hose wagon and a steam fire engine drawn by horses, and a company with an apparatus equal in equipment and pumping ability, but motor driven, we find the salaries, cost of operation and maintenance of the horse-drawn engine company will cost about $4,000 per year more than those of the automobile engine company.

Robinson Jumbo Pumping Engine.
ELYRIA, O., FIRE HOUSES AND APPARATUS.

VICTORIA, B. C.

Chief Thomas Davis has made the following statement from the department accounts:

Cost of maintenance of one horse, $214.99; cost of maintenance of one auto hose wagon, $72; hose capacity of horse-drawn wagon, 1,100 feet; hose capacity of auto wagon, 1,800 feet.

The above is the actual cost of maintenance, including feed, forage, veterinary fees, etc., for the horse-drawn apparatus, and gasoline, spark plugs, oil, etc., for the auto-propelled apparatus.

He estimates that by entirely equipping the department

*Since January 1, 1913, an epidemic of sickness has attacked all the horses at Fire Station N . 2, causing an additional expense of $103.50, as well as the loss of one horse worth $225.

with motor apparatus the city could then dispense with the services of eighteen horses, thus saving $5,415 annually, as follows:

New horses (annual estimate)	$2,000.00
Horse feed (18 horses at $13 per month)	2,808.00
Repairing and renewing harness, brushes, brooms, soap, etc.,	400.00
Stall planks	75.00
Veterinary fees ($20 per month)	240.00
Horse shoeing	540.00
Total cost for one year	$6,063.00

The cost for maintenance of nine pieces of motor apparatus taking the place of the above eighteen horses would be $648, making a saving over cost ot horses of $5,415 per year. This does not take into consideration the increased efficiency, which he considers to be 50 per cent over that of the horse-drawn, as the auto wagon will carry almost double the amount of hose.

"In comparing the cost of maintenance of both apparatus," said he, "I have not included anything for repairs, as I consider they will be equally divided between the horse-drawn and the motor apparatus. Our two machines were put in service on June 2, 1911, and I am pleased to be able to say that they have not cost this department one cent for repairs through any fault in construction."

ALLIANCE, OHIO.

Chief Karl O. Stickle, of the Alliance, O., fire department, makes a report each month to the director of safety. In his July 1 report, for June, he makes the following comparison between cost of motor and of horse apparatus.

Chief's auto cost for the month $7.27, using 38 gallons of gasoline and 3 quarts of oil. The repairs on the car for last month were $12, which was for welding the crank case. The total cost for 42 months' service has been $389.64, or an average of $9.28 a month.

No. 1 auto cost for the month $3.76, using 19 gallons of gasoline and 3 quarts of oil. The total cost for 20 months' service has been $68.97, or an average of $3.45 a month. The amount of equipment that we carry on this one piece of apparatus would require at least three horses to draw it; and as it costs $19.44 a month to keep one horse the total cost for keeping three horses for 20 months would be $1,166.40, or a difference of $1,094.43 between horses and auto apparatus.

No. 3 auto pumping engine cost for the month $15.47, using 17 gallons of gasoline and 4 quarts of oil. During the month the machine was out of service for several days on account of a break in the crank case of the machine, the machine being repaired at a cost of about $12. The total cost of the machine for 45 months' service has been $1,062.66, or an average of $23.62 a month.

As this machine would require at least three horses, the cost for keeping the horses for 45 months would have been $2,624.40, or a difference of $1,561.74 in favor of the auto.

During June the chief's auto traveled 245 miles; No. 1, 12 miles, and No. 3, 49 miles.

ROANOKE, VA.

Roanoke, Va., has nine pieces of horse-drawn apparatus —3 steam engines, 3 chemical and hose, one hose wagon, one aerial truck and one chief's buggy. It also has 3 motor chemical engines carrying hose and ladders. In his report for 1912 Chief James McFall discusses the subject of cost of apparatus as follows:

No. 4 Automobile

220 runs and transfers.
Traveled 487 miles.
Used 272 gallons of gasoline.
Used 18 gallons of lubricating oil.
Traveled 1.8 miles on 1 gallon of gasoline.
Traveled 27 miles on 1 gallon of lubricating oil.

No. 5 Automobile.

131 runs and transfers.
Traveled 459.4 miles.
Used 232 gallons of gasoline.
Used 16 gallons of lubricating oil.
Traveled 2 miles on 1 gallon of gasoline.
Traveled 28 11-16 miles on 1 gallon of lubricating oil.

No. 6 Automobile.

97 runs and transfers.
Traveled 369-7 miles.
Used 185 gallons of gasoline.
Used 14½ gallons of lubricating oil.
Traveled 2 miles on 1 gallon of gasoline.
Traveled 25½ miles on 1 gallon of lubricating oil.

Automobile.—Our three autos cost for the year as follows:

Gasoline, lubricating, Prest-o-Lite tanks, etc	$220.63
Repairs to machines	203.18
Insurance on machines	240.00
Total cost of automobiles	$663.81

Horses.—The cost of maintaining one horse for the

SUMMARY OF MAINTENANCE COST OF MOTOR APPARATUS FOR 1912 AT ROCKFORD, ILL.

	Gasoline	Oil	Repairs	Total	Miles run
Motor Combination No. 1	272½ gals. at 17c.	46 gals. at 35c.	$148.98		625
2 horses	$46.32	$16.10		$211.40	
Cost $16.00 per month					
Motor Engine No. 1	761 gals at 17c.	55 gals. at 35c.	58.05		349
3 horses	$129.45	$19.25		206.85	
Cost $16.00 per month					
Motor Chemical No. 2	198 gals. at 17c.	68 gals. at 35c.	68.35		361
2 horses	$33.66	$22.80		124.81	
Cost $16.00 per month					
Motor Engine No. 2	72 gals. at 17c.	15 gals. at 35c.	.....		34
3 horses	$12.34	$5.25		17.49	
Cost $16.00 per month					
Motor Hook and Ladder Truck	360 gals. at 17c.	59 gals. at 35c.	79.68		440
3 horses	$61.20	$20.65		161.53	
Cost $16.00 per month					
Chief's Car	463 gal. at 17c.	27 gals. at 35c.	178.04		3,500
1 horse	$78.71	$9.45		266.20	
Cost $16.00 per month					

Total cost of maintenance of motor apparatus for 12 months	$988.28
Average cost per month for each	13.73
Cost to feed, bed and shoe 14 horses at $16 per month, which would be necessary to handle the same apparatus were it horse drawn	2,688.00

year was $236.16. This includes feed, shoeing, veterinary, repairs to harness and repairs to apparatus. It would require seven horses to do the work of the three automobiles and would require an expenditure of $1,543.12—thus showing a saving in favor of the automobile over the horses of $879.31.

Again, there is a great saving in maintaining an auto station over that of a horse-drawn station that does not show in these figures, namely, it is not necessary to keep a man on night watch, thus cutting down both the light and fuel bill. It does not require one-third of the soap, pearline, polish, brooms, disinfectants, sponges and many other little articles to keep the station clean. To be brief, the horse is the *one* item of expense in the maintenance of the department. Eliminate him and you have gone a long way to reduce the cost of maintenance.

The auto will answer a call in about one-half of the time of horse-drawn apparatus. With the auto you are at the fire the first minute—the time you are needed, and the very time to do the work to stop the fire.

HIGH, LOW AND AVERAGE COST OF FEED.

	High	Lowest	Average per ton
No. 1 Timothy hay (Western)	$30.00	$20.25	$24.85
Wheat straw	16.50	8.50	11.80
Bran	30.50	24.00	27.53
Daisy middlings	34.40	30.50	33.08
Corn (No. 2 mixed), per bushel	.93	.68	.83
Oats (White clipped), per bushel	.75	.40	.45

PRICES PAID FOR VARIOUS ARTICLES.

Electric light current	.05 per K.W.
Gas	$1.10 per 1,000 ft.
Water	.08 per 1,000 gal.
Gasoline	.16½ per gal.
Lubricating oil	.41 per gal.

BOSTON, MASS.

Fire Commissioner Charles H. Cole of Boston in his report for 1912 says:

"A careful study has been made of the comparative cost of motor and horse-drawn apparatus. The figures are very interesting and do not agree with those given by the builders of motor apparatus. These figures show that in large cities, where the apparatus is called upon to respond to alarms frequently, the cost of upkeep, including interest on the original investment, is greater than the cost of a similar piece of horse-drawn apparatus.

Example 1.

Cost of motor-driven combination chemical and hose wagon, $5,500.	
Interest, 5 per cent, for one year	$275.00
Repairs	38.00
Supplies and tires	390.00
Total	$703.00

Example 2.

Cost of motor-driven combination chemical and hose wagon, $5,500.	
Interest, 5 per cent., for one year	$275.00
Repairs	315.00
Supplies and tires	574.00
Total	$1,164.00

Example 3.

Cost of hose wagon, harness and two horses, $1,500.	
Interest, 5 per cent., for one year	$75.00
Repairs, harness and wagon, rubber tires	100.00
Hay, grain, shoeing, two horses	400.00
Total	$575.00

"The balance in one case is in favor of horse-drawn apparatus by $133, and in the other case by $589.

"This, of course, does not take into consideration efficiency, nor the fact that the department gains the services of the driver as an addition to the fire-fighting force."

Mr. Cole includes interest, but not depreciation, neither of which are taken into account in the other calculations. The salary of the driver which is required for the horse-drawn apparatus would more than balance the larger of the two differences. He also compares a hose wagon with a combination wagon, to the probable advantage of the former.

ALAMEDA, CAL.

The following tables show the expense for maintenance of Engine No. 1 (horse-drawn) and Engine No. 2 (motor-driven) of the Alameda, Cal., fire department for the twelve months ending May 31, 1913. This information was furnished by Fire Chief Walter T. Steinmetz:

Engine No. 1, Drawn by Two Horses.

Clapp & Jones Steamer, Third Size.

	Feed, shoes & medicine.	Gas for heater.	Fuel.	Runs.
June, 1912	$36.00	$14.15	$6.30	3
July, 1912	36.00	12.20	....	3
Aug., 1912	36.00	13.47	....	3
Sept., 1912	36.00	10.15	....	2
Oct., 1912	36.00	12.00	6.20	4
Nov., 1912	36.00	15.56	....	0
Dec., 1913	36.00	13.73	4.00	4
Jan., 1913	36.00	14.83	3.30	5
Feb., 1913	36.00	13.30	4.35	4
Mar., 1913	36.00	14.83	....	0
Apr., 1913	36.00	14.92	6.20	3
May, 1913	36.00	16.28	....	0
	$432.00	$165.42	$30.35	31
	165.42			
	30.35			

$627.77 Total cost per year.

Engine No. 2 (Motor-Driven).

Waterous Automobile Pumping Engine, Third Size.

	Gasoline.	Oil.	Recharge batteries.	Runs.
June, 1912	$1.32	$ .94	....	4
July, 1912	1.98	.37	$ .75	2
Aug., 1912	.82	.75	....	0
Sept., 1912	2.31	.37	.75	1
Oct., 1912	2.97	.37	.75	5
Nov., 1912	1.32	.37	....	1
Dec., 1912	2.31	1.12	.75	3
Jan., 1913	3.96	1.31	.75	1
Feb., 1913	1.65	.37	....	2
Mar., 1913	1.98	1.12	....	1
Apr., 1913	3.96	.75	.75	1
May, 1913	3.30	1.50	.75	0
	$27.88	$9.34	$5.25	21
	9.34			
	5.25			

$42.47 Total cost per year.

COST OF MAINTENANCE NOTES.

Gadsden, Ala.—One two-horse hose wagon cost $30 per month; one motor truck for hose and chemical, $3 a month.

Redlands, Cal.—One horse-drawn chemical and hose cost $275 a year; one motor chemical and hose, $40.80.

Modesto, Cal.—The report for July, 1913, contains the following:

Combination Hose and Chemical Auto

29 gals. gasoline	$4.75
1 gal. measure	.35
5 gals. oil	1.45
Brass polish	.65
Recharging batteries	1.00
	$8.20

Hose Wagon; 2 Horses

Horse shoeing	$6.00
6 sacks barley	7.20
3 sacks bran	3.00
1 spring for clippers	.25
1 rake	.85
5 gals. oil	1.45
Brass polish	.60
1 chamois skin	.75
	$20.10

Boulder, Colo.—Believes that the recent purchase of a combination chemical and hose will enable the city to dispense with one station.

Colorado Springs, Colo.—Cost of keeping one team of horses one year, $336; cost of keeping one piece of motor apparatus one year, $60.

Grand Junction, Colo.—Cost of horse-drawn hose wagon averaged $365 a year. Cost of operating motor chemical and hose carrying ladders was $76 for two years.

Middletown, Conn.—Chemical and hose carrying ladders from April 18, 1910, to April 18, 1913, cost $290.38. Feed, shoeing and veterinary services for five horses, three on truck and two on hose, for same three years, $2,852.14.

Albany, Ga.—Upkeep cost for horses and ladder truck for one year, $420; for combination hose, chemical and ladder for one year, $40.25. This includes all charges. The motor does the work of four horses.

Aurora, Ill.—No. 1 is a combination hose and chemical, horse-drawn; captain, lieutenant, three pipemen and driver in crew. No. 3 is an automobile hose and chemical; captain, lieutenant and three pipemen. The maintenance costs during 1912 were:

	No. 1	No. 3
Salaries	$5,405.54	$4,560.00
Annual vacations	.....	131.28
Apparatus and repairs	164.87	767.99
Buildings and repairs	162.05	71.92
Horse shoeing	55.40	.....
Horse fodder	376.00	Gas. 41.00
Horse renewals	235.00	.....
Fuel	130.27	72.68
Light	3.00	9.02
Laundry	23.50	23.14
New hose	98.50	80.00
Store supplies	120.00	65.50
Insurance and rent	38.00	7.40
Printing and stationery	.....	.....
Garbage and expressage	40.00	.....
Veterinary	10.00	.....
Totals	$6,862.13	$5,829.93

Bloomington, Ill.—Auto apparatus costs 50 per cent less to maintain.

Urbana, Ill.—Expenses for July, 1913: Auto chemical and hose carrying ladders: 4 gallons engine oil, $2.16; 6 gallons gasoline, $1.23; one gallon trans. grease, 8½ cents; presto light, $2.00; total, $5.475. Horse-drawn chemical and hose, ladder truck and chief's buggy: hay, $4.80; straw, $2.25; oats, $27.00; salt, $0.45; currycombs, $0.25; shoeing, $10.50; harness supplies, $0.20; total, $45.65, or $15.22 average per apparatus.

Davenport, Ia.—Six months' use indicates motor apparatus cost about one-third as much as horse-drawn.

Marshalltown, Ia.—The auto chemical and hose carrying ladders for year ending April 1, 1913, cost $32.50 for gas, oil, repairs, etc., while team cost $453.30 for feed, shoeing, harness, veterinary, etc. The cost of the auto per fire was 30 cents; of the team per fire, $4.24.

Atchison, Kan.—Has a chemical and hose and a pumping engine with hose which displaced five horses that cost about $90 a month to keep. The entire cost for both machines has been less than $30 a month, averaging eighteen months' service.

Salina, Kan.—Horse-drawn combination from July 1, 1912, to July 1, 1913, cost $420, two head of horses. Motor apparatus during the same year cost $45 for Anderson-Kissel truck combination, and $50 for chief's car, which is in use all the time.

Brockton, Mass.—Finds motor apparatus cost 35 per cent as much to maintain as horse-drawn.

Danvers, Mass.—Combination auto chemical and hose during 1912 traveled 175 miles, answered 52 alarms and cost for maintenance $31.57 for gasoline, $5.20 for dry batteries, $5.50 for presto light, $15 for oil, grease, waste and polish, and $9 for vitriol and soda; a total of $66.27.

Winthrop, Mass.—The cost of maintaining the chemical and hose truck will not exceed $25 for year; it has been in service for about three years. The cost of maintaining a horse hose wagon and a two-horse chemical which this truck took the place of would be about $625 for year.

Lansing, Mich.—Has had a 600-gallon Webb engine in continuous service 1,495 days; an auto chemical engine in service 1,258 days; a chief's car 1,588 days; combination hose and chemical No. 3, 450 days; combination hose and chemical No. 4, 450 days; Robinson auto engine, 104 days; a total of 6,085 days. Total cost of maintenance for all these, including gasoline, cylinder oil, new tires, overhauling some of the apparatus, accident repairs, in fact every item of expense, was $2,379.21, or 39 cts. per day per apparatus.

Pontiac, Mich.—The auto chemical and hose takes the place of three horses. Cost per head per year for maintaining horses was $248.63. or $745.89 for the three, as compared with $65.23, the cost of upkeep of the auto chemical and hose.

St. Cloud, Minn.—Running gasoline hook and ladder truck from May 1, 1913, to August 1 was 90 cents, against $1 a day for horse-drawn hose wagon. Twelve fires were answered and a total of three miles run by the truck.

Webb City, Mo.—Cost of maintaining chief's car per month: gas, $2; oil, 40 cents; repairs, 40 cents; total, $2.80. Motor chemical and hose: gas, $1.50; oil, 50 cents; repairs, 75 cents; total, $2.75. Does not include tire wear. Chemical and hose has had 55 runs this year.

Bozeman, Mont.—Cost of keeping fire team one year, $408. Cost of chemical and hose carrying ladders for year ending April 30, 1913, $40.01.

Summit, N. J.—An express company is paid $120 a year to keep a team of horses in the fire house for ladder truck, allowing $3 additional for every fire run to, town taking no risks of injury to horses. Average number of fires about 55, giving average cost per year for horses of $285. Expenses of four pieces of motor apparatus for the year ending June 30th were $289 for gas, oil and repairs.

Amsterdam, N. Y.—Average cost of motor truck, $2 a month; horse-drawn apparatus, $30 a month.

Mt. Vernon, N. Y.—Three-wheel tractors on engine and on truck each replaced 3 horses which cost about $70 per month per hitch. Each tractor averages about $2.50 per month. The chemical and hose combinations each replaced 2 horses which cost about $45 per month per hitch, the motor combinations averaging about $3.50 per month.

New Rochelle, N. Y.—Cost of motor chemical for month of July, $2.44; cost of two-horse chemical same month, $26.33. Cost of triple combination hose, chemical and pumping engine for July, $5.96. Cost of four horses for two horse-drawn apparatus, hose and chemical and steam engine, $45.95.

Raleigh, N. C.—Average cost of two chemical and hose, carrying ladders, $9.08 per month; average cost of horse-drawn, $26.

Delaware, Ohio.—Two months of chemical and hose and hook and ladder average about $3 per month. Horse-drawn combination about $16 per month.

Marietta, Ohio.—Costs five times as much to keep a team as it does a motor. Not many runs.

Salem, Ohio.—Combination hose and chemical replaced a three-horse hose and chemical. Maintenance of horses cost about $60 a month; motor apparatus, be-

tween $4 and $5, and saved one man costing $75 a month.

Meadville, Pa.—Horse-drawn apparatus, chemical and hose, ladder truck and hose wagon cost $380 a year; motor combination engine, hose and chemical cost $17.85 in seven months and a half, answering 43 alarms and testing and teaching men to run same.

Wilkes-Barre, Pa.—Chemical auto cost about $7 a month; team which it replaced, $50.

East Providence, R. I.—Never used horses. Auto chemical and hose carrying ladders cost last year $51.20 for repairs, $17.50 for gas and $3 for battery charging; a total of $71.70. Answered 99 alarms.

Pawtucket, R. I.—Motor apparatus cost 50 per cent less than horse-drawn.

Charleston, S. C.—A horse-drawn chemical engine and steam fire engine and hose wagon in twelve months cost about $750 for five horses, including forage and shoeing. Gasoline, oil, charging storage batteries, etc., for motor combination chemical engine, hose wagon and tractor for second size engine cost $92.56; in addition to which it should be considered that three men are saved at a cost of $3,000 a year.

Florence, S. C.—A Seagrave auto 40-gallon chemical in service 16 months has cost $88; no repairs and no break-downs. During the same time two horses and hose wagon cost $480.

Nashville, Tenn.—To maintain an engine company of four horses for the first six months of 1913 averaged $33.95 per month for horse feed; to maintain a motor triple combination fire engine, chemical and hose car, which displaced a horse-drawn engine company of four horses, averaged $3.19 per month for gasoline and auto oil, there being no other expense. The motor company is now doing the same work with six men that formerly required eight before the change, at $85 per man.

El Paso, Texas.—Horse-drawn cost about $30 to $35 a month, while motor-drawn cost $5 to $10 a month and covers three times the territory.

Hoquiam, Wash.—Running a chemical and hose, and pumping engine with hose, for four months has averaged $10 a month, as against $88 for horse-drawn steamer and hose wagon.

Spokane, Wash.—Cost of operating nine pieces of auto apparatus for the year 1912, $1,692.42; total mileage, 15,684, giving a cost of a little over 10 cents a mile. Cost of operating seventeen pieces of horse-drawn apparatus, $7,339.19; total mileage, 13,314; cost per mile, $1.70. Or cost of auto apparatus per year, $188.05 each; of horse-drawn, $431.71 each.

MACHINE SHOP FOR SAVANNAH.

During the year 1912 there was added to the equipment of the fire department of Savannah, Ga., a complete repair shop, located at headquarters and consisting of the following: Lathe, drill press, power hack saw, emery wheel and stand, hand drill press, traveling crane and chain block, anvil and forge, and all the necessary tools. In his annual report, Chief Ballantyne says that "a better addition was never made in the department. All necessary repairs to apparatus can be attended to at once."

LIFE OF AN AUTO.

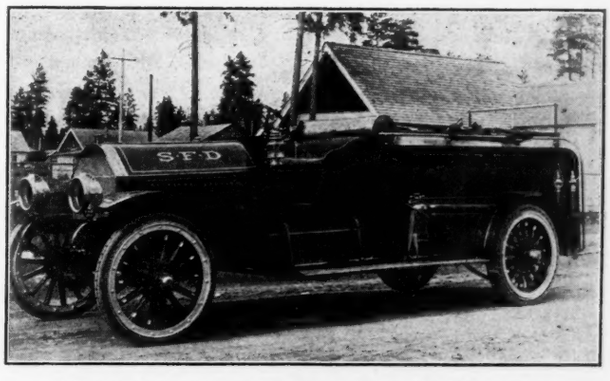
In comparing the annual costs of maintaining horse-drawn and automobile apparatus, nothing is allowed in most calculations for interest or depreciation; in fact, little appears to be known concerning the life of automobile apparatus, owing to the short time it has been in use. Charleston, S. C., in 1906 purchased a car to be used by the chief and assistant chief, and last year reported that, after a continuous service of six years, it was in such a condition as did not warrant any further extensive expenditures for repairs; and it was recommended that it be replaced with a new machine. Last year the machine attended 167 fires and used the extinguishers which it carries 33 times, and the axes 21 times

BOSTON'S CHAUFFEURS' SCHOOL.

The Boston fire department maintains a school of instruction for chauffeurs. Here an elaborate equipment has been installed, consisting of an automobile chassis with the working parts exposed to view of the students (loaned to the department by the Studebaker Company) and a demonstrating automobile which is set up on a testing plant. Through the use of these the students have become thoroughly acquainted with the handling of the speed or transmission levers without liability of accident. The instruction consists of lectures by a professor of gas engineering from Worcester Polytechnic Institute, practical demonstration of automobile construction, practice on testing plant, and is completed with road work on a piece of motor fire apparatus.

FIRE DEPARTMENT BUILDS APPARATUS.

The Spokane, Wash., fire department has an extensive machine shop and not only does all the repairing necessary for the department, but has utilized its machinery and mechanics for building new apparatus as well, and claims that it can save over 50 per cent of the cost by doing so. The illustrations show an auto hose wagon which has been completed by the department from the designs of chief A. L. Weeks. The department is now building an 80-horse-power combination chemical and hose.



AUTO HOSE WAGON BUILT BY SPOKANE FIRE DEPARTMENT.

Six cylinder, 60 h.p., weighs 6,450 lbs. Carries 1,500 feet of 2½-inch hose. Speed, 35 miles per hour. Designed by A. L. Weeks, Chief of Fire Department.

INSPECTION BY FIRE CHIEFS.

Canton, Ohio, had the lowest per capita fire loss of any Ohio city, according to the National Underwriters' Association, and Chief Mesnar attributes this to the care which he exerts in endeavoring to prevent fires by inspection. He aims to be a good fire inspector as well as a good fire fighter, saying, "Preventing fires may not get you glory and applause that fighting them does, but it gets the goods, and that is what counts." Canton is divided by the chief into eight fire districts, each inspected by the firemen of the fire station situated in that particular district. The firemen take their turns visiting every business house and public building once a month to see that the persons in charge are complying with the safety regulations. One of the firemen at the central station is sent into the various districts on unexpected tours to see that the inspection is being properly done. During the year 1912 over 1,200 buildings were inspected. Merchants who looked upon this system when first inaugurated as troublesome and unnecessary now recognize that their interests, as well as the interests of the fire department and city in general, are being served; excepting a few instances where it was necessary to file affidavits, the system has been looked upon as good. It is believed that the business houses and apartment houses of Canton are kept cleaner than in any other city in the state. Whenever an inspector reports that a property owner is not observing the code, the chief generally pays the man a visit and warns him, and if he fails to heed this the chief then files an affidavit against him.

Petaluma, Cal., is a comparatively small city, and during 1912 responded to only 32 alarms, of which 3 were false. During 1912, however, Chief R. S. Adams inspected 91 mercantile buildings, 3 theatres, 2 nickelodeons, 4 churches, 4 schools, 4 hotels, 5 factories, 3 mills, 2 foundries, 1 winery, 4 public garages, 12 private garages, 5 laundries, 4 lumber yards and 5 oil houses—which must have covered pretty nearly everything but the residences in the town. Two arrests were made and 62 persons ordered to remove rubbish.

The fire force of Boston, Mass., in 1912 made 19,408 inspections of schoolhouses, theatres, motion picture houses and other buildings, and the department issued 3,248 permits for fires in the open air; blasting, storage and transportation of dynamite; and storage, sale and discharge of fireworks.

FIRE ALARM NOTES.

In addition to the 34 street fire alarm boxes given in the table as installed in Tiffin, Ohio, eight of the largest manufacturing plants of that city are connected directly into the switchboard by means of a New York subway box. Also 12 combination police alarm boxes are readily available for transmitting fire alarms. In Milwaukee, Wis., in addition to the 553 public fire alarm boxes there are 176 private boxes; and quite a number of the cities report private boxes in addition to the public ones listed in the tables.

Fire chief J. L. Bardine of Juniata, Pa., writes: "We have the plug system, which works fine. If there is any borough that is not able to put in an electric system, if they will write me I will explain the plug system. It cost the borough of Juniata $17 to put the system in." We presume that this is the system which has recently been explained and recommended to small cities by Pennsylvania state fire marshall Baldwin, which provides for numbering the fire hydrants (or "plugs") in each town and printing these numbers with the locations on cards which are generally distributed. Citizens are supposed to keep this card and also be familiar with the number of the hydrant nearest their residence. In case of a fire the engine house is called up by 'phone and this number given, which number is also used in ringing the alarm to inform the volunteers where the fire is located. The cost of the system is that of painting the numbers on the fire hydrants and printing cards containing the locations of the several numbers.

HOW FIRES WERE EXTINGUISHED.

Most fire chiefs' reports show causes, or presumable causes, of all fires during the year, but the report of Chief Salter of the Omaha, Neb., fire department gives the method of extinguishing fires for the year. His last report shows that of 988 fires, 305 were extinguished by the use of one hydrant, 71 by two hydrants, 27 by three hydrants or more, 2 by one engine and hydrant, one by two engines and hydrant, 2 by three engines and hydrant, 3 by four engines and hydrant; 224 were extinguished by chemicals, 21 by garden hose, 4 by sprinkler system, 17 by the chemical engine, 74 by firemen using pails of water; 61 were cut out or smothered, and 173 were extinguished by the occupants.

Chief A. B. Canfield of Ogden, Utah, publishes similar information in his report for 1912 as follows: Fires extinguished by chemical and water, 29; by chemical alone, 28; by buckets of water, 16; by garden hose, 3; fire hose alone, 13; salt, 1; cut wires, 2; shut off power, 1; beat out, 12; smothered, 4; burned out, 18.

Chief A. B. Teneyck of Hamilton, Ont., reports as follows: During 1912 39 fires were extinguished by chemical engines, 19 by chemical engines and water, 9 by chemical engines and hand chemical, 2 by chemical engine, hand chemical and water, 49 by hand chemical extinguisher, 5 by hand chemical extinguisher and water, 72 by water alone.

LIGHTENING COMBINATION WAGONS.

Chief Frank Zeilsdorf of the Wausau, Wis., fire department, in his report for 1912, recommended that the chemical tanks be removed from the three combination chemical and hose wagons, horse-drawn, and placed on a motor-driven apparatus, which apparatus could then respond to every fire call in the city (any part of which it could reach in five minutes) and could also be used as a chief's car in place of the present horse and buggy. The advantage of this would be not only that the chemicals could reach almost any fire more quickly, but also that it would lighten the load of each combination wagon by about one thousand pounds. The wagons are at present too heavy for two horses at all times, and there are three or four months of the year when they cannot be used at all.

FIRE HORSES CLEAN STREETS.

In South Haven, Mich., the streets are cleaned by a horse-drawn flushing wagon, and the fire team is used for hauling this wagon. The team begins at 3 A. M. each morning, and flushes nine blocks of brick pavement, which usually occupies about two and a half hours. The teams are driven by men from the fire department.

FIRE DEPARTMENT COST RECORDS.

The comparison of costs requires a more careful and itemized system of cost keeping and accounting than is ordinarily practised by fire departments, and we present herewith a tabulation of the costs of the Charleston S. C., department for the year 1912 as an illustration of how one company keeps such records. In addition to the items given, there were a number under the head of "Department General Use," such as "Fireman Beaudrot's Expenses, New York School of Instruction," "Shirts and Uniforms for Members," "Reward for Information of False Alarms." All new purchases also were given under this head. (For the table, see page 288.)

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AUGUST 28, 1913.

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Volunteer Fire Companies.

Among the many hundred letters, reports and other matters which have reached us during the past two or three weeks in connection with our preparation for this fire number, we have received several from chiefs of volunteer fire companies complaining of the treatment of these companies and the slight estimation in which they are held in too many cities. One of these states that legislators, fire marshals and fire journals are aiming too high and considering only paid fire department service which, while good in a way and in large cities is not well adapted to the small communities. In such communities, he says, it does not pay to have horses men and apparatus standing around and drawing pay for only two or three fires a year. The mechanical equipment should be on hand, with every facility for getting it and the men quickly to the fire, but the cost of a paid force may be more than the fire loss which they would prevent.

This correspondent states that volunteers comprise about 75 per cent of the fire service in the United States but get practically no pay and very little recognition from anyone. We are inclined to question the figure given, unless possibly it referred to numbers of men rather than of cities. Volunteer companies are generally much larger than paid ones. One city of 6,000 population reports 300 men in their volunteer companies, or about one-tenth of the entire male population. In this city, at least, it would look as though the volunteers were not denied the recognition due them—there must at least have been some inducement to have caused such a large number of the men of this town to join the service. In most cases there are inducements, such as relief from certain duties as citizens or taxpayers, which are offered in lieu of pay to volunteer firemen.

There is, however, no doubt considerable truth in the statement that in many places a paid service would not be economical. Undoubtedly the volunteers will not reach a fire as quickly nor work as effectively as a paid force, but the difference in fire loss due to this would in a great many towns average much less per year than the additional cost of a paid department of any size.

Horse or Auto Apparatus.

Scores of chiefs and other Fire Department officials are now asking: "Should we have auto fire apparatus in our city? Would it cost less or be more effective than horses?"

An article in this issue gives reports from about fifty cities concerning the relative cost of horse-drawn and automobile apparatus which, while it shows great variation in relative costs, at least reveals no city where it is not confidently asserted that the motor apparatus is much the cheaper to maintain.* As to the efficiency of the motor apparatus, there is little question in the minds of most that for chemical and hose, at least, it is much more desirable than horse-drawn; and many departments are finding that the latest designs of other apparatus are just as effective, if not more so, than the horsedrawn; the single posssible exception being the gasoline pump, and we believe that there are only a few chiefs, and those in the larger cities, which have any fault to find with these, and any objectionable weaknesses are being rapidly eliminated.

We believe a conservative conclusion from the figures which we have collected would be that the maintenance of automobile apparatus in cities of from 25,000 to 100,000 population costs approximately one-third that of similar horse-drawn apparatus; also that, in any but the largest cities at least, one piece of automobile apparatus will cover two or three times as much territory as similar horse-drawn apparatus.

But this is not the whole story. There still remains to be learned and compared the relative life of motor apparatus and of horsedrawn apparatus, the latter including the useful life of the horse as well. Also, the relative purchase costs of motor apparatus and of horse-drawn apparatus (including horses) are to be compared on the basis of annual interest and sinking fund payments. Few, if any, cities can furnish us with these figures; in fact, there are very few instances of motor apparatus having reached the end of its useful life. (One such instance is noted elsewhere in this issue). Some estimate, however, of these should be made by any city in deciding whether motor apparatus would be cheaper for it.

The greatest doubt probably occurs in the case of the smaller cities and villages where maintenance charges

*Since writing this the Boston statement has been received. But the figures themselves, as explained on page 271, support this conclusion.

of motor apparatus are small and interest and sinking fund charges relatively high.

If horses are kept throughout the year, always ready for fires which do not occur more than once in two to six months, together with a driver to exercise them, it seems very probable that automobile apparatus would be cheaper. But in a great many cases horses are not kept permanently, but arrangements are made for using teams belonging to private parties in case of infrequent fires. We refer elsewhere to one city which pays $285 a year for having a private team stabled in the engine house for fires which average about one a week. Another town pays $5 for the first team to reach the engine house, whenever the fire bell rings, and $2.50 for the second team. In another city public hacks stand near the engine house, and a hack team is called upon in case of fire. In still other and possibly smaller places hand apparatus is used.

It is a question in small places whether the infrequent fires and the probable amount of loss from them would warant any more expensive methods. The motor apparatus is generally considerably more expensive to purchase than the horsedrawn or handdrawn, and the interest and depreciation on the difference between these costs might amount to more than the cost of private horse service arranged for in some such way as those referred to, plus the actual fire loss resulting from the difference in time required to reach the fire by the two kinds of apparatus. This is a question that each small community must settle for itself on the basis of local conditions.

For the community of 25,000 or over, however, we believe there is no longer any question that reliable motor apparatus, such as is turned out by the best manufacturers at present, is much more effective and much more economical than horsedrawn apparatus, and is unquestionably and rightly taking its place with remarkable rapidity.

Present Status of Fire Equipment.

About five years ago a revolution in the design of fire apparatus was heralded. The death knell of the steam fire engine was supposed by some to have been sounded and a new era inaugurated. Systems of mains in congested districts carrying water under high pressure and automobile pumping engines in the residential districts were to be the new order of things. While it is true that high pressure fire systems are of increasing importance and motor traction is an unquestioned success, nevertheless the steam fire engine is as important a factor in extinguishing fires as it was five years ago. High pressure systems, on account of their high cost, will probably be limited to comparatively small areas for many years yet.

The error in the prophecy regarding the fate of the steamer originated from a confusion of two separate problems—provision of motive power for the vehicle and for the pump. It was hastily assumed by many that gasoline traction necessarily implied gasoline pumping. The common sight of a steam fire engine drawn by tractors through city streets faster, under better control, and with less confusion to street traffic than ever before, has shown that the steamer is as good as it ever was.

However, if the prophecies of five years ago have not come true, it is certain that the introduction of automobile fire apparatus has revolutionized the means of propelling the vehicle. Every type of fire apparatus heretofore standard has proved itself adaptable to the new means of locomotion. To review, briefly, in detail: A large percentage of all fires, particularly in residential districts and small cities, have for a long time been extinguished with chemical equipment. Chemical and combination wagons are perhaps the strongest automobile proposition. Their adaptability to the load carried and their speed have placed automobile apparatus far in the lead in this class. They are being adopted everywhere. In the matter of pumping engines, although the steamer motorized is as good as ever, an entirely new type of engine has been developed—the gasoline-propelled and operated pumping engines. In speed in reaching a fire (owing to their moderate weight) and in quickness of getting into action (as the motive power is immediately at command at its maximum capacity) the motor pumping engine rivals the chemical engine. Of the several types of gasoline pumping engine, rotary pumps are simplest and lightest in weight, piston pumping engines the most positive in action and capable of sustaining the highest pressures, and turbines perhaps the most promising in possibilities of development.

Ladder trucks, which were among the last pieces of apparatus to receive the attention of the designers of motor fire apparatus, are now among the most successful and important. The weight of the apparatus and the desirability of using both front and rear sets of wheels for steering were difficulties that had to be solved, and have been solved in different ways. The presence of a gasoline engine on the truck has made possible the raising of aerial ladders by a mechanism as simple and reliable in its action as the compressed air device, formerly and still used.

Co-operation Between Fire and Other Departments.

We have several times spoken editorially concerning the desirability of co-operation between the several departments of the city government. In too many cases each department acts independently of the others and without paying any or sufficient attention to the bearing which the needs of the other departments may have upon planning and construction work which it may have to do.

This interrelation between departments applies to the fire department to a greater extent than is ordinarily realized, and it seems to us that the head of this department should be consulted more frequently, or, if he is not, that he should call attention to the desirability of consulting the fire department's needs in carrying out the work of the other departments. For instance, in paving or repaving streets or in any way tearing up or otherwise blocking the roadways of streets, the effect which this will have upon the accessibility to all parts of the city by fire apparatus should be considered. The simultaneous tearing up of two or three parallel streets might easily cause a most disastrous delay to apparatus in reaching a fire in a certain section of the city, and when such is the case the chief of the fire department should protest against it. And he should always be notified in advance of the blocking of any street.

The work of the department which collects the garbage and rubbish also is of importance to fire departments, in that many fires start in rubbish which is allowed to collect in dangerous places. Chief W. A Howard of Peterborough, Ont., in his report for 1912 says, "The introduction of the collection of garbage last year has had a far-reaching effect. I found the premises of our business district in better shape last year than ever before; and during the year we did not have a cellar fire nor a fire caused by the accumulation of combustible rubbish."

Even more definite, however, is the relation between the fire department and the water department, since a large percentage of fires are extinguished by water drawn from the street mains through fire hydrants. The engineers of the water department are best able to cal-

culate the sizes of mains for carrying given amounts of water; but an experienced fire chief or commissioner should be better fitted by his experience to determine, in making the plans, how many fire streams should be available for any given block in the city, and to indicate the exact spots where it would be best to locate the several fire hydrants. On this latter point it seems to us that the fire chief should be consulted whenever any new fire hydrants are to be located. In the operation and maintenance of these hydrants the water and fire departments should co-operate. It would seem that the best plan would be to place the hydrants in sole charge of the chief of the fire department, who should refuse to permit anyone except an employee of the department to use the fire hydrants, and who could call upon the water department for any repairs necessary to be made to them.

Any chief can probably call to mind other ways in which the actions of the fire department interlock with those of other departments; for instance, the wires of the street lighting department would be one of the first to come to mind. Each chief should take a broad view of his duties, responsibilities and rights; and it would seem to be a part of his duty not only to extinguish fires, but to exert what influence he can on the other departments along the lines indicated.

FIRE APPARATUS FIGURES

Horse-Drawn, Automobile and Hand Apparatus.—Amo unt of Each Kind in Each of Six Hundred Cities.—Hose, Alarm Boxes, Oxygen Helmets, Pulmotors, Cellar Pipes, Searchlights.

The figures given in the accompanying tables, reported directly to us by the chiefs of about 600 fire departments, bring out several interesting facts, those which will interest the greatest number being probably reports concerning the increasing use of fire apparatus. The figures show not only that such apparatus is gradually replacing horse-drawn apparatus in middle sized cities to which it seems to be peculiarly adapted, but that it is being adopted in both the smallest and the largest cities as well. Another fact which the figures bring out is the increasing use of the triple-combination apparatus and also of aerial ladder trucks. The use of tractors for engines and trucks is increasing also.

Altogether, the figures indicate an adoption of motor apparatus even more extensive than seemed probable a year or two ago, in that a considerable number of cities, instead of waiting for the growth of the city or the wearing out of old horse-drawn apparatus before adopting the motor-drawn, have either purchased tractors for the heavier horse-drawn apparatus, or have placed such apparatus among the reserves and substituted motor apparatus for it. Certain features of this development are discussed elsewhere in this issue.

In addition to the apparatus named in the table, the following are in use by the several cities: A motorcycle is used by the chief at Gadsden, Ala., and Boulder, Colo. Horse-drawn fuel and supply wagons are used at Berkeley, Cal.; Atlanta (2) and Savannah, Ga.; Bloomington and East St. Louis, Ill.; Terre Taute, Ind.; Louisville, Ky.; Brockton (6), Foxboro and Newton, Mass. (7); Kansas City, Mo. (4); Trenton (7) and Woodbridge, N. J.; Cohoes (2), Jamestown, Lestershire, Rochester (2) and Troy, N. Y. (11); Bryan, Canton and Elyria, O. (2); Guthrie, Okla.; Astoria, Ore.; Altoona and Scranton, Pa. (3); Providence, R. I.; Charleston, S. C. (2); Knoxville (2), and Nashville, Tenn.; Spokane, Wash.; Milwaukee, Wis. (5); Hamilton, Ont. (3).

Exercising wagons are found in New Haven, Conn., Elgin (5) and Rockford, Ill. (6); Medford, Mass. (5); Rochester, Minn.; East Orange, N. J. (5); Cohoes (3), and Oswego, N. Y. (4); Pawtucket (6), and Providence, R. I. (25); Milwaukee, Wis.

Savannah, Ga., has a horse-drawn tool wagon with a turret nozzle and an oil supply wagon. Louisville, Ky., has a hydrant wagon. Escanaba, Mich., has a horse-drawn supply wagon carrying 1,500 feet of reserve hose. Superior, Wis., has a horse-drawn fuel wagon carrying a turret nozzle. Danvers, Mass., has a horse-drawn forest fire wagon. Horse-drawn turret wagons are owned by Kansas City, Mo.; Elmira, N. Y., (2), and Oklahoma City, Okla. Paterson, N. J., has a motor supply wagon. Yonkers, N. Y., has a horse-drawn repair wagon, as has also Woonsocket, R. I., and Providence, R. I., has a master mechanic's buggy. The Monessen, Pa., department has a horse-drawn ambulance. Motor wagons for the fire alarm officials are owned by New Haven, Conn.; Terre Haute, Ind.; Louisville, Ky. (2); Kansas City, Mo.; Binghamton, N. Y.; Schenectady, N. Y.; and horsedrawn wagons for the same are found in Davenport, Ia.; Louisville, Ky.; Troy, N. Y.; Oklahoma City and Tulsa, Okla., Providence, R. I. (3), Windsor, Ont.

Sleighs for winter use of apparatus are quite common in Canada. Brantford, Ont., has two sleighs and a chief's cutter; Hamilton, Ont., nine hose and hook and ladder sleighs; Kingston, Ont., four hose sleighs, a chief's cutter and sleigh runners for all apparatus; London, Ont., six sleighs and one cutter; Petersborough, Ont., four sleighs.

Many of the chiefs in answering stated that the department intended to purchase motor apparatus as soon as possible, among these being the following: Newnan, Ga.; Kokomo, Ind.; Irvington, N. J. (city service truck and triple combination); Ashland, Jackson and Lorain, O. (2 tractors for steam fire engines and 2 chemical and hose combinations); Fayetteville, Tenn.; Tyler, Tex., and Stratford, Ont. The chief of the Savannah, Ga., department recommends the purchase of a fire boat, which was recommended by the National Board of Fire Underwriters.

The figures in these tables show 90 cities using oxygen helmets, 40 using pulmotors, 254 using cellar pipes and 170 using searchlights. (Answers to the last are somewhat indefinite in some cases, as a number using the headlights of automobiles for this purpose reported them as searchlights, while others did not.) Tractors were reported as used on 52 pieces of apparatus.

The amount of hose fit for fire service, averaging all places which reported this and also their populations, was one foot for each 3.67 inhabitants.

These figures and other data are of special interest to the smaller communities, since half of the places reporting were under 10,000 population; 29 per cent were of 10,000 to 25,000 population; 12 per cent were from 25,000 to 50,000, and 9 per cent had more than 50,000 population. Omitting the largest cities, the sums of the populations in all the cities of each of these classes are approximately equal. The fact that 46 per cent of these cities report owning automobile apparatus, therefore, indicates to what extent such apparatus is being adopted by the smaller communities.

FIRE APPARATUS IN AMERICAN CITIES.

Table No. 1.—Horse Drawn Apparatus.

Name of City.	Population.	Pumping engines.	Chemical engines.	Hose wagons.	Hose reels.	Chemical and hose.	Ladder trucks.	Aerial trucks.	Water towers.	Chief's buggies.
Alabama:										
Florence	7,000	..	..	1	..	..	1	..	..	..
Gadsden	12,000	1	..	1	..	..	..	..	..	..
Montgomery	50,000	4	1	5	..	..	1	1	..	2
Opelika	6,000	..	..	..	..	1	..	..	..	..
Talladega	7,000	..	..	2	2	..	1	..	..	..
Arkansas:										
Fayetteville	5,000	..	..	1	1	..	..	..	..	..
Pine Bluff	2,500	..	..	3	..	..	..	..	..	..
California:										
Alameda	24,000	1	1	3	..	2	1	..	..	..
Berkeley	50,000	1	1	3	..	1	..	..	..	2
Fresno	40,000	5	2	3 (1)	..	2	(1)	1	..	1
Hanford	7,000	2	..	1	2	1	1	..	..	..
Long Beach	30,000	1	..	..	..	1	..	..	..	1
Los Angeles	450,000	27	2	2	..	28	4	2	1	5
Merced	4,000	2 (1)	..	1	2	..	..	..	..	..
Modesto	6,327	..	..	1	2	..	..	..	..	..
Oakland	200,000	14 (3)	1	6 (3)	..	8 (1)	5	..	..	(3)
Petaluma	7,500	..	..	..	..	..	..	..	..	..
Red Bluff	4,000	3	..	3	..	..	..	..	..	..
Redlands	10,500	..	..	..	..	1	..	..	..	..
Riverside	16,500	..	..	..	..	..	1	..	..	..
San Bernardino	15,000	..	..	1	..	..	..	..	..	..
Santa Clara	5,500	..	..	..	..	..	..	..	..	..
Santa Monica	15,000	..	..	..	..	..	..	..	..	..
Santa Rosa	10,000	1 (1)	..	1 (1)	..	..	..	..	..	..
Stockton	35,000	2 (1)	1 (1)	2 (1)	..	..	..	1	..	(1)
Colorado:										
Boulder	11,000	..	..	1	..	2	..	..	..	..
Colorado Springs	30,140	(1)	..	..	..	2	(1)	1	..	(1)
Grand Junction	8,500	..	..	(1)	..	..	..	..	..	..
Greeley	10,000	..	..	..	(3)	..	..	..	..	..
Pueblo	50,000	..	..	3	..	1	..	..	..	..
Rocky Ford	5,000	..	..	..	..	1	1	..	..	..
Salida	4,500	..	..	1	2	..	1	..	..	..
Trinidad	1,400	..	..	1 (1)	2	1	1	..	..	..
Victor	5,000	..	..	1	1	..	..	..	..	..
Connecticut:										
Danbury	23,000	1 (1)	..	2	..	..	..	1	..	1
Middletown	11,000	..	..	1	..	1	1	..	..	..
New Britain	52,000	3	..	..	..	5	1	1	..	..
New Haven	150,000	11 (2)	(1)	5 (2)	..	6	2 (1)	..	..	..
Putnam	6,750	..	..	3	..	..	1	..	..	..
Willimantic	11,000	..	..	..	3	3	2	..	..	..
Delaware:										
Wilmington	96,000	13	2	2	3	5	2	1	..	2
Georgia:										
Albany	12,000	(1)	..	(1)	..	..	1	..	..	..
Athens	17,000	..	..	2	..	..	1	..	..	1
Atlanta	154,839	9	2	10 (1)	..	3	5	1	1	2
Brunswick	12,000	1	..	4 (b)	..	..	1	..	..	1
Columbus	....	2 (1)	(1)	4 (1)	..	..	1	..	..	1
Cuthbert	....	1	..	1	3	..	..	..	..	..
Elberton	7,500	..	..	1	1	..	..	..	..	..
Macon	50,000	..	..	..	..	..	..	..	..	..
Newnan	6,000	..	1	1	..	..	..	..	..	..
Savannah	75,000	(3)	(1)	..	..	..	3 (1)	2	..	(3)
Idaho:										
Idaho Falls	6,000	..	..	..	..	1	..	..	..	..
Lewiston	7,000	..	..	..	..	..	..	..	..	..
Wallace	3,500	..	..	1	2	..	..	..	..	..
Weiser	3,300	..	..	..	..	..	..	..	..	..
Illinois:										
Aurora	40,000	(1)	..	1	..	2	..	1	..	1
Beardstown	6,500	..	..	..	3	..	..	..	1	..
Belleville	23,017	(2)	..	..	2	1	1	..	..	1
Belvidere	7,900	..	..	..	..	2	1	..	..	..
Bloomington	30,000	2	2	4	..	1	1	..	..	2
Canton	12,000	..	1	1	1	..	1	..	..	..
Chester	2,900	..	..	..	..	..	..	..	..	..
Danville	32,000	..	2	6	..	..	1	..	..	1
Decatur	35,000	2	..	1	..	..	1	..	..	1
De Kalb	9,000	..	..	..	..	..	..	..	..	..
East St. Louis	70,000	3	..	3	2	4	..	1	..	3
Elgin	26,000	..	..	3	1	2	1	..	..	1
Fairbury	2,500	..	..	..	..	..	..	..	1	..
Galena	6,000	..	1	1	4	1	1	..	..	..
Harvey	9,000	..	..	..	..	1	..	..	..	..
Mt. Olive	3,510	..	..	..	..	..	1	..	..	..
Moline	30,000	..	..	3	1	..	1	..	..	1
Monmouth	9,187	..	..	2	..	1	1	..	..	..
Mt. Vernon	11,000	(1)	(1)	..	..	..	..	..	..	..
Naperville	3,500	..	..	..	4	1	1	..	..	..
Princeton	4,800	..	..	2	..	..	..	..	..	..
Quincy	....	6	1	..	4	2	..	1	..	..
Rockford	55,000	4	..	..	..	6 (1)	..	..	..	2
Sterling	10,000	..	..	1	2	1	..	1	..	..
Urbana	10,000	..	..	..	..	1	1	..	..	1
Vandalia	4,000	..	..	1	..	..	..	..	..	..
Waukegan	17,000	..	..	..	..	1	1	..	..	..
Westville	5,000	1	..	1	..	2	1	..	..	..
Indiana:										
Boonville	4,500	..	..	..	1	..	1	..	..	..
Connersville	9,650	..	..	2	1	4	1 (c)	..	..	1
East Chicago	20,000	1	..	2	..	1	..	..	..	2
Gary	45,000	..	..	..	..	..	1	..	..	..
Kendallville	5,000	..	..	..	2	1 (a)	..	..	..	..
Kokomo	20,000	1	..	2	..	1	1	..	..	1
Logansport	20,000	(1)	..	4	..	5	1	..	..	1
Madison	8,468	3	..	1	3 (2)	..	..	..	..	..
Michigan City	32,000	2	..	2	..	..	1	..	..	1

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FIRE APPARATUS IN AMERICAN CITIES.

Table No. 1.—Horse Drawn Apparatus.—Continued.

Name of City.	Population.	Pumping engines.	Chemical engines.	Hose wagons.	Hose reels.	Chemical and hose.	Ladder trucks.	Aerial trucks.	Water towers.	Chief's buggies.
Indiana—Continued.										
Mt. Vernon	6,500	..	..	1	1	..	1	..	..	..
Portland	5,130	..	4	1	..	1	1	..	..	..
Richmond	25,000	1	..	1	..	5	1	..	..	1
Rockport	2,700	..	..	1	1	..	1	..	..	..
Shelbyville	10,000	..	..	2	..	..	1	..	..	..
South Bend	50,000	..	..	8 (1)	..	..	1	..	..	(2)
Terre Haute	65,000	3	..	5 (1)	(1)	5	2	1	..	3
Union City	6,000	..	1	1	1	1	1	..	..	..
Vincennes	17,000	..	..	2	..	1	1	..	..	1
Warsaw	5,000	..	..	..	..	1	..	..	..	..
Washington	10,000	1	1	2	..	..	..	..	..	..
Iowa:										
Cedar Falls	6,500	..	..	1	3	..	2	..	..	..
Davenport	45,528	..	..	6 (1)	..	..	..	..	..	1
Des Moines	86,368	..	3	8 (1)	..	5	4	1	..	1
Dubuque	40,000	4	1	1	2	3	1	1	..	..
Fairfield	5,000	..	..	1	1	..	..	..	..	..
Keokuk	14,000	1	..	(1)	3	1	1	..	..	1
Manchester	35,000	1	1	1	3	..	1	..	..	..
Marshalltown	14,000	..	..	..	..	1	..	..	..	..
Sioux City	....	1	1	3	..	2	1	1	..	2
Kansas:										
Atchison	18,000	2	..	1	1	..	..	1	..	1
Hiawatha	3,500	..	..	..	..	..	..	..	..	..
Independence	....	..	1	1	..	..	..	..	..	..
Leavenworth	....	..	1	1	1	2	..	..	..	..
Manhattan	7,000	..	..	1	1	1	..	..	..	..
Parsons	19,040	..	..	1	..	1	..	1	..	1
Salina	12,000	..	..	..	..	1	..	..	..	..
Winfield	6,700	..	..	..	..	1	1	..	..	..
Kentucky:										
Bowling Green	11,000	..	..	..	..	2	1	..	..	1
Louisville	240,000	21 (2)	..	1	15 (4)	5 (1)	2 (1)	4	1	5
Shelbyville	4,000	1	..	1 (a)	..	..	..	..	..	..
Louisiana:										
Shreveport	35,000	1	..	1	..	2	..	..	..	..
Thibodaux	4,000	1	..	4	1	..	1	..	..	..
Maine:										
Biddeford	19,000	3	..	3	4	1	1	..	..	1
Brunswick	7,500	2	1	2	5	1	1	..	..	..
Gardiner	6,000	3	..	7	..	..	1	..	..	..
Hallowell	2,700	1	..	1	4	..	1	..	..	..
Millinocket	4,000	..	..	1	2	1	1	..	..	..
Saco	7,000	1 (1)	..	1 (1)	..	..	1	..	..	..
Skowhegan	6,000	1	..	1	1	..	1	..	..	..
South Paris	1,600	..	..	5	5	..	1	..	..	..
Maryland:										
Cumberland	27,000	..	..	..	2	3	..	1	..	..
Massachusetts:										
Arlington	13,000	..	..	1	..	..	1	..	..	..
Ayer	3,000	..	..	3	1	..	1	..	..	..
Brockton	65,000	5 (1)	1 (2)	4 (1)	..	..	1 (1)	2	1	..
Cambridge	106,000	7 (1)	2	7	..	2	4 (1)	1	1 (d)	2 (1)
Chelsea	38,000	3	..	3	..	..	1	..	..	1
Danvers	10,000	..	..	4	3	1	1	..	..	..
Falmouth	3,500	..	1	..	8	1	1	..	2	..
Foxboro	3,800	1	1	1	..	..	1	..	..	..
Marlboro	15,000	..	..	5 (2)	..	1	1	..	..	3
Medford	27,200	1	(1)	2	..	2	(1)	..	..	1
New Bedford	105,000	8	..	6	..	1	1	3	..	1
Newton	40,000	3	(2)	4 (1)	(1)	3	1	..	..	(2)
Pittsfield	40,000	4	..	..	..	3	1	..	..	(1)
Quincy	35,000	1	..	2	..	3	3 (e)	..	..	..
Revere	18,000	2 (1)	..	1	1	3	1	..	..	..
Somerville	....	4	..	3	..	3	3	..	..	2
Swampscott	6,500	1	1	1	..	..	1	..	..	1
Taunton	35,000	3	..	3	..	2	3	1	..	1
Waltham	29,000	2	1	4	..	1	1	1	..	1
Warren	4,600	2	..	2	2	..	2	..	..	..
Watertown	15,000	1	..	1 (1)	..	..	1 (1)	..	..	..
Webster	12,000	1	..	2	2	..	1	..	..	..
Winthrop	16,000	1	1	2	..	1	1 (f)	..	..	1
Michigan:										
Alma	3,500	..	..	1	..	..	1	..	..	..
Battle Creek	30,000	2	..	1	..	4	..	1	..	..
Bessemer	5,000	..	..	2 (f)	1	..	..	..	..	..
Escanaba	14,500	..	..	1	..	1	1 (g)	..	..	..
Flint	40,000	1	..	2	..	..	1	..	..	1
Greenville	....	..	..	1	1	..	1	..	..	..
Jackson	35,000	3	..	..	(2)	3	(1)	1	..	(1)
Lansing	40,000	..	..	(1)	..	..	1	..	..	(1)
Marine City	3,770	..	..	..	..	..	..	..	..	..
Menominee	15,000	(1)	..	3	(2)	..	1	..	..	1
Mt. Clemens	9,500	..	..	1	1	1	1	..	..	..
Muskegon	25,000	1	..	3	..	3	1 (1)	(1)	..	1
Otsego	3,500	..	..	1	2	..	1	..	..	..
Petosky	....	..	3	..	..	..	..	..	..	..
Pontiac	20,000	2	..	2	1	1	..	1	..	1
St. Joseph	6,000	1	..	1	..	..	1	..	..	..
Sault Ste Marie	15,000	..	..	1	3	1	1	..	..	1
South Haven	5,000	..	..	..	1	1	..	..	..	..
Traverse City	12,000	2	2	2	4	..	2	..	..	1
Minnesota:										
Alexandria	3,000	..	..	..	..	..	..	..	..	..
Brainerd	9,500	..	..	2	..	..	..	..	..	..
Cloquet	7,031	..	(1)	1 (1)	..	..	1f(1)	..	..	..
Detroit	3,500	..	1	..	2	..	1	..	1	..
Duluth	78,000	6	1 (3)	4 (1)	(1)	1	3	1	..	(2)
E. Grand Forks	3,200	1	1	1	1	1	1	..	..	..
Hastings	4,000	1	1	..	3	..	1	..	..	..
Hibbing	12,000	..	2	2	..	1	1	..	..	1

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FIRE APPARATUS IN AMERICAN CITIES.

Table No. 1.—Horse Drawn Apparatus. —Continued.

Name of City.	Population.	Pumping engines.	Chemical engines.	Hose wagons.	Hose reels.	Chemical and hose.	Ladder trucks.	Aerial trucks.	Water towers.	Chief's buggies.
Minnesota—Continued.										
Litchfield	2,900	..	..	2	1	1	1	..	..	..
Mankato	11,000	..	..	3	..	..	2	..	..	1 (1)
Minneapolis	375,000	22 (2)	1 (6)	7	1 (9)	13	6 (1)	4	1	(8)
Owatonna	....	..	1	1	2	1	1	..	..	..
Red Wing	10,000	2	..	4	..	1	1	..	..	1
Rochester	8,600	..	..	1	1	..	1	..	..	1
St. Cloud	1,150	..	..	1	..	..	1	..	..	..
St. Paul	250,000	22	2	19	3	..	9	2	..	3
Sauk Center	2,500	1	1	..	2	1	1	..	..	..
Shakopee	2,303	1	..	2	..	..	1	..	1	..
Stillwater	....	2 (h)	..	1	1	..	1	..	..	..
Two Harbors	5,000	..	1	1	..	..	1	..	..	..
Willmar	5,000	1	..	..	2	..	1	1	1	..
Worthington	3,000	..	..	3	..	1	1	..	..	..
Mississippi:										
Brookhaven	5,500	..	..	1	4	..	..	..	..	..
Corinth	6,500	..	..	..	..	..	..	..	..	..
Greenville	12,070	..	..	..	..	3 (1)	1 (f)	..	..	1
Hattiesburg	....	1	4	..	3	1	..	..	1	..
Jackson	21,262	2	..	2 (1)	..	2	(1)	..	..	..
Laurel	1,100	..	..	1	7	..	..	..	..	..
Port Gibson	2,280	..	..	..	..	..	..	..	..	..
Vicksburg	24,000	2	..	1	1	3	1	..	..	2
Yazoo City	10,000	(1)	..	2	2	..	1	..	..	1
Missouri:										
Carthage	10,000	..	..	1	..	..	1	..	..	1
Chillicothe	8,000	..	..	1	..	1	1	..	..	..
Clinton	6,000	..	..	1	..	1	..	..	..	..
Fulton	6,000	..	..	1	1	..	..	..	..	..
Hannibal	20,000	..	..	1	3	2	1	..	..	..
Jefferson	15,000	..	..	1	..	..	1	..	..	..
Kansas City	250,000	11 (2)	(1)	18	4 (2)	3	5 (1)	3 (1)	1 (1)	7 (2)
Kirksville	8,000	..	..	1	(2)	3	..	..	..	..
Marysville	7,000	..	..	2	3	1	..	..	1	..
Monroe	2,300	1	..	..	1	..	..	..	..	..
Pleasant Hill	2,200	..	..	..	..	..	..	..	..	..
Peirce City	1,900	..	..	..	2	..	1	..	..	..
Rich Hill	3,000	..	..	1	..	..	..	..	..	..
St. Joseph	80,000	(2)	(1)	14 (1)	1 (2)	2	..	2 (1)	1	(1)
St. Louis	832,000	48 (7)	..	6	..	43 (8)	9 (2)	9 (2)	2	13 (2)
Springfield	50,000	2	..	..	1	..	1	1	..	..
Washington	4,800	..	..	..	..	..	..	..	..	..
Webb City	1,500	..	..	..	..	..	..	..	..	..
Montana:										
Bozeman	6,000	(1)	..	..	..	(1)	(1)	..	..	..
Kalispell	7,000	..	..	..	2	1	1	..	..	..
Red Lodge	5,000	..	..	..	..	1	..	..	..	..
Nebraska:										
Alliance	6,000	..	..	..	..	..	..	..	..	..
Ashland	1,600	..	..	..	..	..	1	..	..	..
Beatrice	10,000	..	..	..	..	1	1	..	..	..
Blair	3,000	..	1	4	..	..	1	..	..	..
Columbus	6,000	..	..	..	..	..	1	..	..	..
Fremont	10,000	..	1	2	3	1	1	..	..	..
Grand Island	11,000	..	..	..	..	1	..	..	..	1
Hastings	10,000	..	..	1	1	..	1	..	..	..
Havelock	3,500	..	..	..	..	..	..	..	..	..
Kearney	8,000	..	..	..	..	..	1	..	..	..
Lincoln	45,000	1	(1)	3 (1)	..	..	2	1	..	..
Nebraska City	6,000	1	1	1	..	1	1	..	..	..
Omaha	126,000	4 (1)	2	11 (2)	..	(1)	4 (1)	1 (1)	1	2 (1)
Red Cloud	2,000	2	1	3	3	..	1	..	..	..
Schuyler	2,500	..	1	..	..	..	1	..	..	..
South Omaha	27,000	1	..	5	..	1	1	..	..	1
Wahoo	2,168	..	..	1	..	..	1	..	..	..
New Hampshire:										
Concord	21,497	4	1	6 (1)	(1)	..	1 (1)	..	..	1
Dover	14,000	3	1	4	..	1	1	..	..	..
Manchester	70,063	7	1	6	(2)	3	5	1	..	1
Nashua	....	4	1	4	..	..	2	..	..	2
New Jersey:										
Atlantic City	48,000	10	1	..	1	×	1	3	..	3
Boonton	5,000	..	..	2	..	..	2	..	..	..
Bordentown	5,000	1	..	2	..	..	..	..	..	..
Burlington	9,000	2	1	4	4	..	1	1	1	..
Dover	8,000	..	..	..	..	..	1	..	..	..
East Orange	....	..	..	2	..	5	1	1	..	1
Englewood	10,500	..	..	3 (i)	1	..	2	..	..	..
Flemington	3,000	2	..	..	2	..	1	..	..	..
Hackensack	14,000	2	..	2	..	2	1	..	..	..
Harrison	15,000	..	..	2	(2)	1	1	..	..	..
Irvington	15,000	..	..	1	..	..	1	..	..	..
Jersey City	275,000	17	1	5	..	13	1	6	..	..
Keyport	4,000	..	1	..	4	..	2	..	..	7
Lambertville	5,000	1	1	..	2	3	1	..	..	..
Morristown	13,000	2	..	3	..	..	..	..	..	..
Passaic	65,000	5	..	..	..	..	..	..	..	..
Paterson	135,000	4 (2)	..	6	..	2	1	..	..	..
Princeton	5,000	1	1	..	3	..	1	..	..	..
Prospect Park	2,800	..	..	..	..	..	..	..	..	..
Rutherford	9,000	..	..	3	..	..	1	..	..	..
Salem	8,000	1	1	..	4	..	1	..	..	..
Summit	9,500	..	..	..	..	..	1	..	..	..
Trenton	100,000	7 (1)	..	5 (2)	..	..	..	2	1	..
Wharton	3,000	..	..	..	..	..	..	..	..	..
Woodbridge	3,000	..	..	1	1	..	1	..	..	..
New Mexico:										
Raton	5,000	..	..	..	..	1	..	..	..	..

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FIRE APPARATUS IN AMERICAN CITIES.

Table No. 1.—Horse Drawn Apparatus.—Continued.

Name of City.	Population.	Pumping engines.	Chemical engines.	Hose wagons.	Hose reels.	Chemical and hose.	Ladder trucks.	Aerial trucks.	Water towers.	Chief's buggies.
New York:										
Addison	2,800	..	..	..	..	..	..	..	..	..
Amsterdam	35,000	1	..	2	4	4	1	..	..	..
Auburn	36,000	(2)	..	2	..	2	1	1	..	..
Binghamton	....	3	..	1	..	1	1	1	..	1
Canajoharie	3,000	..	..	..	..	..	..	..	..	..
Canandaigua	7,217	1	..	1	..	1	1	..	..	..
Canisteo	2,500	1	..	4	4	..	1	..	..	..
Canton	3,000	1	..	..	2	..	..	..	..	..
Cohoes	24,709	5	..	2	1	4	..	2	..	1
Cortland	12,000	(1)	..	1	..	1	1	..	..	..
Delhi	1,800	..	..	..	..	..	..	..	..	..
Depew	6,000	..	..	1	..	..	1	..	..	..
Deposit	2,500	..	..	..	..	..	..	..	..	..
Dobbs Ferry	3,500	..	..	..	..	1	..	1	..	..
Elmira	40,000	5	..	..	..	5	1	1	..	..
Fort Plain	3,000	..	..	..	5	..	1	..	..	..
Geneva	13,000	2	..	2	4	1	..	2	..	..
Gloversville	21,000	..	..	1	..	2	(1)	1	..	(1)
Goshen	3,500	..	..	..	..	1	..	..	..	..
Green Island	4,780	1	..	2	..	..	..	..	..	..
Horneli	15,000	..	..	3	..	1	..	1	..	1
Jamestown	33,000	2	..	1	1	2	2	1	..	1
Johnstown	11,000	..	..	1	..	..	1	..	..	..
Keeseville	2,000	..	..	..	..	..	..	..	..	..
Lancaster	5,000	..	..	2	1	..	1	..	..	..
Le Roy	4,500	..	1	..	..	..	1	..	..	..
Lestershire	5,200	1	..	2	1	..	1	..	..	..
Lowville	3,800	..	1	1	6	1	1	1	..	..
Little Falls	14,000	..	..	5	1	..	1	..	..	..
Malone	8,000	1	1	2	..	..	1	..	..	..
Mt. Vernon	35,000	2	..	(3)	..	4	1 (1)	..	..	2
Newburgh	29,000	4	2	6	1	2	1	1	..	..
New Rochelle	31,700	1	..	1	..	4	1	..	..	..
North Tonowanda	13,000	1	..	6 (2)	2	..	1	..	..	..
Ogdensburg	18,000	2	..	..	..	3	(1)	1	..	..
Olean	15,000	..	..	1 (j)	..	1	1	..	..	1
Oswego	25,000	3	2 (1)	2 (2)	..	1	1 (1)	1	..	1
Peekskill	16,000	..	..	1	..	2	1	..	..	..
Poughkeepsie	30,000	2	..	..	..	..	..	1	..	..
Rochester	225,000	15 (1)	..	4 (3)	..	15	6	3 (1)	1 (1)	2
Rome	22,240	3	..	1	..	2	..	1	..	1
Saratoga Springs	13,000	(1)	..	3 (1)	(1)	1	..	(1)	..	1
Schenectady	80,000	4	8	..	..	..	2	2	2	2
Solvay	5,300	..	..	..	..	..	..	..	..	..
Southampton	3,000	2	..	1	10	..	1	..	..	..
Syracuse	145,000	10	..	9	..	3	5	5	1	3
Troy	76,000	11	..	2	1	9	3	..	..	3
Utica	74,420	6	1	3 (2)	..	5	1	2	..	2
Waterloo	4,500	1	..	..	..	..	..	..	..	..
Whitehall	6,000	2	..	2	5	..	1	..	1	..
Yonkers	....	..	..	2	..	8	3	1	..	..
North Carolina:										
Burlington	6,000	2	..	2	2	..	1	..	1	1
Charlotte	45,000	2	..	1	..	3	1	..	..	1
Elizabeth City	10,000	2	..	2	1	..	1	..	..	..
Greensboro	....	..	..	4	1	1	..	1	1	..
Henderson	7,500	..	(1)	2 (1)	..	(1)	1	..	..	..
Mooresville	3,500	..	..	1	..	..	..	..	..	..
Raleigh	20,000	(1)	..	1 (1)	..	..	1	..	..	..
Reidsville	6,000	1	..	1	2	2	1	..	3	..
Salisbury	8,000	1	..	1	1	..	1	..	..	..
North Dakota:										
Dickinson	5,000	1	..	..	..	..	..	..	..	..
Grand Forks	15,000	1	..	3	..	1	1	..	..	..
Mandan	5,000	..	..	..	..	..	..	..	..	..
Ohio:										
Alliance	17,000	..	..	..	..	1	..	..	..	..
Ashland	8,000	1	1	1	1	1	1	..	..	..
Ashtabula	22,000	2	1	4	3	..	1	..	..	..
Bellaire	15,000	..	1	..	..	1	1 (1)	..	..	1
Bellevue	6,000	1	..	1	2	..	..	..	..	..
Bellefontaine	10,000	..	..	2	..	..	1	..	..	..
Bryan	4,600	1	..	1	..	1	..	1	..	..
Bucyrus	8,640	1	..	1 (1)	1	..	1	..	..	1
Canal Dover	8,000	2	..	..	2	..	1	..	..	..
Canton	....	2	1	..	2	3	1	1	..	1
Celina	4,500	..	..	1	1	..	1	..	..	..
Cincinnati	398,000	34	..	52	..	..	13	3	2	..
Circleville	7,000	..	..	1	1	..	(1)	..	..	..
Columbus	....	18	1	3	..	15	5	4	1	..
Conneaut	12,000	..	..	1	..	..	1	..	..	..
Covington	1,900	..	..	..	..	..	..	..	..	..
Delaware	10,000	..	..	..	..	1	..	..	..	..
Dennison	4,200	..	..	..	..	..	..	..	..	..
East Cleveland	13,000	..	..	..	..	..	..	..	..	..
East Liverpool	24,000	(1)	..	1 (1)	..	3	..	1	..	..
Elyria	16,000	1	..	..	..	1	..	1	..	..
Galion	9,000	1	1	2	1	2	1	..	..	1
Gallipolis	6,500	..	..	2	2	..	1	..	..	..
Jackson	6,000	1	..	1	(1)	..	..	..	..	..
Kenton	8,000	..	..	2	..	1	..	..	..	..
Lima	32,000	2	..	4	1	2	1	1	..	1
Lorain	30,000	2	..	1	..	5	(1)	..	..	..
Mansfield	22,000	1	1	3	..	..	1	..	..	1
Marietta	15,000	3	..	2	..	..	..	1	..	..
Marion	....	..	..	..	..	..	1	..	..	1
Mt. Vernon	10,000	..	..	2	..	..	1	..	..	1
Napoleon	4,500	1	..	..	1	1	1	..	..	..
Nelsonville	6,082	..	..	1	..	..	..	..	..	..
Newark	25,400	..	..	..	1	3	1	..	..	..
Oberlin	5,000	..	..	1	..	1	1	..	..	..
Port Clinton	3,300	1	1	..	3	..	1	..	..	..
Portsmouth	26,000	2	..	..	2	..	..	1	..	1
Ravenna	5,310	..	..	..	..	1	1	..	..	..
St. Bernard	5,200	..	..	..	..	1	1	..	..	..
St. Marys	5,500	..	..	1	1	4	1	..	..	..
Salem	9,000	1	..	..	..	..	1	..	..	..

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FIRE APPARATUS IN AMERICAN CITIES.

Table No. 1.—Horse Drawn Apparatus. —Continued.

Name of City.	Population.	Pumping engines.	Chemical engines.	Hose wagons.	Hose reels.	Chemical and hose.	Ladder trucks.	Aerial trucks.	Water towers.	Chief's buggies.
Ohio—Continued.										
Tiffin	12,000	..	..	..	1	1	1	..	..	1
Toledo	200,000	14	..	..	..	17	8	1	1	3
Toronto	4,300	..	..	..	..	..	..	..	..	..
Urbana	8,000	..	..	1	..	1	..	..	..	..
Warren	15,000	..	..	..	..	1	1	..	..	1
West Park	4,000	..	..	..	..	..	..	..	..	..
Wilmington	....	1	..	1	..	..	1	..	..	..
Oklahoma:										
Ardmore	10,000	1	1	1	..	..	1 (gj)	..	..	1
Durant	8,000	..	..	1	..	..	1 (f)	..	..	..
Guthrie	1,400	1	..	2	..	..	1	..	..	1
McAlester	1,500	..	1	2	..	..	1 (f)	..	..	1
Mangum	5,000	..	..	1	1	..	..	..	..	..
Muskogee	35,000	3 (1)	(1)	2	..	1	1	1	..	..
Nowata	5,000	..	..	1	..	..	..	..	..	..
Oklahoma City	....	7	..	2	..	8	3	1	1	..
Pawhuska	5,500	..	..	1	..	1	1	..	..	..
Ponca City	5,040	..	..	..	..	..	..	..	..	..
Sapulpa	10,000	..	..	1	..	..	1	..	..	..
Tulsa	35,000	..	..	..	..	..	..	..	..	..
Wagoner	5,500	..	..	1	..	..	1	..	..	..
Oregon:										
Astoria	10,000	(2)	(1)	2 (1)	..	..	..	1	..	1
McMinnville	3,500	..	..	..	..	..	..	..	..	..
Salem	15,000	2	..	..	..	1 (1)	..	..	..	..
Pennsylvania:										
Altoona	53,000	6	..	6	(1)	2	1	1	..	1
Beaver	3,500	..	..	..	..	..	..	1	..	..
Bellefonte	4,500	2	..	1	..	..	1	..	..	..
Bristol	10,000	1	..	1	..	..	1	..	..	..
Brookville	4,000	..	..	..	..	..	1	..	..	..
Carlisle	11,000	3	1	1	4	1	1	1	..	..
Coatesville	12,000	2	2	..	..	1	1	..	..	..
Doylestown	4,000	..	..	..	..	..	..	..	..	..
Easton	....	4	1	1	3	4	2	1	..	1
East Stroudsburg	4,300	..	..	..	..	..	..	..	..	..
Edgewood	2,000	..	..	1	..	..	..	..	..	..
Edwardsville	10,000	..	..	..	1	1	..	..	..	..
Farrell	14,000	..	..	1	..	1	1	..	..	..
Franklin	9,800	1	..	2	..	..	..	..	..	..
Gallatzin	3,500	..	..	..	2	1	1	..	..	..
Harrisburg	....	7	..	2	1	9	3	..	..	..
Honesdale	7,000	2	1	1	..	..	1	..	..	..
Jermyn	3,100	..	..	..	..	..	..	..	..	..
Johnstown	58,000	7	..	2 (2)	..	7	..	2	..	..
Juniata	7,500	..	..	1	2	1	..	..	..	..
Kane	7,000	..	..	2	..	1	1	..	..	..
Lansdowne	5,000	..	..	1	..	1	1	..	..	..
Latrobe	9,000	..	..	..	5	..	1	..	..	..
Mauch Chunk	4,000	3	1	2	..	..	1	..	..	..
Meadville	15,000	..	..	1	..	1	1	..	..	..
Monessen	....	..	..	..	..	..	1 (g)	..	..	..
Nanticoke	20,000	..	..	1	..	..	1	..	..	..
New Brighton	9,000	..	..	2	1 (1)	..	1	..	..	..
New Castle	....	(1)	..	..	..	4	1	1	..	..
Norristown	29,000	3	2	1	..	2	1	..	..	..
North East	4,000	..	..	..	..	..	1	..	..	..
Oil City	20,000	1	..	3	1	..	1	..	..	..
Pottsville	23,000	4	..	2	..	2	..	1	..	..
Rankin	6,000	..	..	..	2	1 (a)	..	..	..	..
Reading	97,000	12	2	..	..	11	2	1	..	1
Ridgway	6,000	..	..	2	..	..	..	..	..	..
Sayre	6,500	..	..	..	..	..	1	..	..	..
Scranton	130,000	(7)	(1)	6	(1)	8 (a)	..	(1)	..	(1)
Sewickley	5,500	..	..	..	..	1	1	..	..	..
Shamokin	20,000	1	..	1	3	3	..	1	..	..
South Brownsville	3,900	..	..	..	..	1	..	..	..	..
Steelton	15,000	1	..	1	..	2	1	..	..	..
Sunbury	13,700	2	..	5	2	1	1	..	..	1
Towanda	5,000	1	..	..	..	..	..	..	..	..
Uniontown	20,000	1	1	1	1	2	1	..	..	..
Watsontown	2,000	1	..	..	2	..	1	..	..	..
West Chester	12,000	..	..	..	..	..	..	..	..	..
Wilkes Barre	67,000	6	1	1	..	6	2	2	..	1
Rhode Island:										
East Providence	15,808	..	..	..	..	..	..	..	..	..
Pawtucket	53,000	(2)	(1)	..	..	2	2	..	..	(1)
Providence	236,000	14 (3)	..	6 (3)	..	11	5 (1)	5 (1)	1	(1)
Westerly	....	2	1	2	4	..	1	..	..	..
Woonsocket	40,000	(2)	..	1 (2)	1	3	2	..	..	..
South Carolina:										
Aiken	4,000	1	..	1	..	..	..	..	..	..
Charleston	59,000	6 (3)	1	4 (3)	..	1 (1)	1	1	1	1
Chester	....	..	..	2	..	..	1	..	1	1
Florence	8,000	..	..	2	..	..	1	..	..	..
Georgetown	6,750	(1)	..	..	(1)	1	1	..	1 (1)	..
Newberry	6,000	..	..	2	..	..	..	..	..	..
Orangeburg	8,000	..	..	2	(5)	..	1	..	..	..
Rock Hill	10,000	(1)	..	1 (f)	3	..	..	..	..	..
Spartanburg	18,000	(1)	..	2 (1)	1	1	1	..	..	..
Sumter	10,000	1	..	2	1	1	..	..	..	..
South Dakota:										
Aberdeen	13,503	1	..	..	..	2	..	..	..	..
Brookings	4,000	..	..	..	..	..	..	..	..	..
Mitchell	8,000	..	1	1	3	1	1	..	..	..
Pierre	3,700	..	..	2	2	..	2	..	..	..
Sioux Falls	18,160	1	1	1 (1)	1	1	1	..	..	1
Vermillion	2,500	..	..	..	..	..	..	..	..	..
Tennessee:										
Chattanooga	8,000	6	..	1	1 (1)	4	..	1	..	..
Covington	5,000	..	..	1	..	..	..	..	..	..
Fayetteville	3,700	..	..	1	..	..	..	..	..	..
Greenville	5,000	..	..	..	..	..	..	..	..	..
Knoxville	....	5	1	1 (1)	1 (1)	4	..	1	1	1
Manheim	3,000	..	..	..	..	..	..	..	..	..
Nashville	135,364	9 (2)	(2)	2	1 (2)	6	(1)	2	..	(3)

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FIRE APPARATUS IN AMERICAN CITIES.

Table No. 1.—Horse Drawn Apparatus. —Continued.

Name of City.	Population.	Pumping engines.	Chemical engines.	Hose wagons.	Hose reels.	Chemical and hose.	Ladder trucks.	Aerial trucks.	Water towers.	Chief's buggies.
Texas:										
Beaumont	35,000	5 (1)	2 (1)	3	..	2	1	1	..	1
Brownsville	11,000	..	..	..	..	1	..	..	..	..
Brownwood	9,000	..	1	..	..	2	..	..	..	..
Comanche	4,000	..	(1)	..	..	1	..	..	..	..
Corpus Christi	15,000	..	..	..	1	1	2	..	1	..
Eagle Pass	4,000	..	..	..	..	..	..	..	..	..
El Paso	50,000	2	..	..	..	5	1	1	..	..
Forth Worth	75,000	3	1	8	..	1	2	1	..	2
Georgetown	5,000	..	..	..	..	..	..	..	..	..
Honey Grove	3,500	1	..	1	1	1	1	..	..	..
Lufkin	3,500	..	..	..	1	1	..	..	..	..
McKinney	10,000	1	..	2	..	..	..	..	..	..
Navasota	5,000	..	..	..	..	..	..	..	..	..
Paris	17,000	1	1	1	2	..	1	..	..	..
Sherman	16,000	1	1	2	..	..	1	..	..	1
Tyler	1,300	..	1	(1)	..	1	1	..	..	..
Utah:										
Ephraim	2,500	..	..	..	..	..	..	..	..	..
Ogden	30,000	1	1	2	1	1	1	1	..	..
Salt Lake City	100,000	4	1	4	1	..	3	1	..	..
Vermont:										
Bennington	9,000	1	..	1	3	..	1	..	..	..
Montpelier	9,000	..	..	3	2	..	1	..	..	..
Rutland	14,000	2	..	2	..	..	..	1	..	..
St. Albans	6,500	..	..	2	..	..	1	..	..	1
Virginia:										
Alexandria	16,000	2 (1)	..	2	1	..	1	..	..	1
Charlottesville	10,000	1	..	1	..	..	1	..	..	..
Farmville	4,000	..	1	1	..	1	..	..	..	..
Fredericksburg	6,000	..	..	..	..	..	..	..	..	..
Harrisonburg	5,000	1	..	..	..	..	..	..	..	..
Lexington	4,500	..	..	..	..	..	..	..	..	..
Lynchburg	30,000	3	3	5	..	3	1	1	1	1
Marion	3,200	..	..	..	..	..	..	..	..	..
Newport News	25,000	3	..	2	..	1	1	1	..	1
Portsmouth	35,000	3	..	..	..	5	..	1	..	..
Roanoke	45,000	3	..	1	..	3	..	1	..	1
Salem	4,000	..	..	1 (a)	..	..	..	..	..	..
Staunton	11,000	..	..	1	..	1	..	..	..	..
Wytheville	4,000	..	..	1	2	..	1	..	..	..
Washington:										
Ellensburg	5,000	1	..	2	..	1	..	..	..	..
Everett	24,814	1	..	2	2	1	..	..	..	(1)
Hoquiam	10,000	..	..	..	..	2 (1)	1	..	..	..
North Yakima	18,000	..	..	..	..	..	..	..	..	..
Olympia	9,000	..	..	1	..	1	..	..	..	..
Snohomish	4,500	1	..	1	..	..	..	..	..	..
Spokane	104,000	4	..	2	..	5	3	..	..	..
Vancouver	12,000	2	..	2	2	1	..	..	..	..
West Virginia:										
Benwood	7,000	..	2	2	1	2	..	..	..	..
Bluefield	15,000	..	..	1	..	1	..	..	..	..
Keyser	6,000	..	..	..	3	..	1	..	..	..
Morgantown	15,000	..	..	1 (a)	..	..	..	..	..	..
Wisconsin:										
Algoma	2,500	..	..	..	..	..	1	..	..	..
Appleton	18,000	1	..	3 (1)	..	1	1	..	..	1
Ashland	....	..	1	3	2	1	1	..	..	1
Baraboo	6,500	..	..	..	1	2	1	..	..	..
Beaver Dam	7,000	..	..	2	1	..	1	..	1	..
Berlin	5,000	1	..	2	..	..	1	..	..	..
Chippewa Falls	9,000	..	1	3 (2)	(1)	2	1	..	..	..
Columbus	2,400	1	..	..	..	..	1	..	..	..
De Pere	5,000	1	..	1	1	..	1	..	2	..
Eau Claire	20,000	(1)	..	3 (1)	(1)	..	1	..	..	..
Fond Du Lac	18,800	1	..	1	1	1	1 (1)	..	..	1
Hudson	....	..	..	..	1	..	1	..	..	..
Janesville	14,000	1	..	2	..	..	2 (g)	1	..	..
Jefferson	3,000	..	..	..	..	..	..	..	..	..
Manitowoc	15,000	2	1	3	..	..	1	..	..	1
Marinette	1,700	2	..	4	..	..	1	..	..	1
Menasha	600	1	..	2	..	..	1	..	..	..
Merrill	9,000	..	..	2	1	..	1	..	..	..
Milwaukee	400,000	27 (3)	6 (2)	20 (4)	..	10	9 (1)	4 (1)	1	(5)
Oconomowoc	3,200	1	..	..	..	1	1	..	..	1
Oshkosh	33,062	2	..	6	1	1	2	1	..	..
Plymouth	3,300	..	..	..	..	..	..	..	..	..
Racine	42,000	2	..	4	2	..	2	..	..	..
Rhinelander	6,500	..	..	1 (2)	..	1	1	..	..	..
Rice Lake	4,000	1	..	1	..	..	..	..	..	..
Stevens Point	10,000	1	..	2	..	..	1	..	..	..
Stoughton	5,000	..	..	1	2	..	1	..	..	..
Superior	45,000	3	..	1	..	4	1	..	..	..
Two Rivers	5,000	1	1	1	..	..	1	..	..	..
Waupun	3,000	..	1	1	..	..	1	..	1	..
Wausau	18,000	2	..	1	..	3	1	..	..	1
Canada:										
Brantford, Ont.	25,000	..	..	4	1	..	2	1	..	1
Chatham, Ont.	14,000	1	..	2	..	..	1	..	..	..
Hamilton, Ont.	100,000	2	..	3	..	4	3	..	..	2
Kingston, Ont.	21,000	2 (1)	..	4 (2)	..	1	2 (1)	..	..	1
London, Ont.	52,000	1	1	(3)	(1)	4	2	1	..	1
Peterborough, Ont.	2,250	1	..	2	..	..	1	..	..	1
St. Catherine, Ont.	14,000	2	..	1	1	..	1	..	..	..
Sault Ste Marie, Ont.	14,600	1	..	2 (1)	3 (1)	..	1	..	..	..
Stratford, Ont.	17,000	1	..	1	1	..	1	..	..	..
Victoria, B. C.	65,000	2 (1)	..	1 (2)	..	4	..	1 (1)	..	1
Windsor, Ont.	22,000	..	..	2 (2)	..	1	1	1	..	..

(a) Carries ladders. (b) Two of these are double hose wagons. (c) Also a hook and ladder carrying chemical. (d) Applied to aerial. (e) Two of these combination ladder trucks. (f) Carries chemical. (g) Carries hose. (h) One steam and one gasoline. (i) Two carry ladders. (j) With turret pipe.

Figures in parenthesis indicate apparatus in reserve.

FIRE APPARATUS IN AMERICAN CITIES.—Table No. 2.—Motor Propelled Apparatus.

City.	Chief's cars. With chemical tanks.	Chief's cars. Without chemical tanks.	Squad wagons. With chemical tanks.	Squad wagons. Without chemical tanks.	Hose wagons.	Chemical engines.	Chemical and hose.	Chemical and hose carrying ladders.	Hook and ladder trucks. Gasoline.	Hook and ladder trucks. Electric.	Gasoline pumping engines. Without hose or chemical.	Gasoline pumping engines. With hose.	Gasoline pumping engines. With chemical.	Gasoline pumping engines. With hose and chemical.	Gasoline propelled steam pumping engines.	Repair and service wagons.	Apparatus named on which tractors are used.	Number of wheels on tractors.	Kind of tires preferred for heavy motor apparatus.
Alabama:																			
Gadsden	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid block
Montgomery	..	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	.....	..	Dayton airless
California:																			
Alameda	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	.....	..	Solid rubber
Berkeley	..	1	..	..	..	..	3	..	..	..	..	..	..	1	..	..	.....	..	Solid or cushion
Fresno	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Hanford	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Long Beach	1	..	..	..	..	..	2	..	1	..	..	..	..	1	..	..	Ladder truck	..	Solid
Modesto	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Los Angeles	..	5	..	..	..	..	10	10	2	..	1	7	..	..	..	1	1 eng. &2 trucks	4	Solid
Oakland	..	5	..	..	..	1	5	..	..	..	1	1	..	..	..	1	.....	..	Solid
Petaluma	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.....	..	Solid
Redlands	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	Swinehart
Riverside	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	.....	..	Solid
San Bernardino	..	1	..	..	..	..	..	2	1	..	..	..	..	..	..	..	Ladder truck	..	Fisk bolted on
Santa Clara	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	United States
Santa Monica	..	1	..	..	..	..	..	2	..	..	2	..	..	..	..	..	.....	..	.....
Santa Rosa	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Fisk pneumatic
Stockton	..	1	..	..	..	..	..	1	..	..	..	1	..	..	..	..	.....	..	Solid
Colorado:																			
Boulder	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Firestone or Good
Colorado Springs	1	..	..	..	..	..	..	2	..	..	..	..	..	..	1	..	.....	..	Fisk
Grand Junction	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	.....	..	Solid rubber
Greeley	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Pueblo	..	2	..	..	..	..	..	2	1	..	..	..	..	1	..	..	2	3	.....
Salida	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.....	..	.....
Trinidad	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	Solid rubber
Victor	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Goodrich
Connecticut:																			
Danbury	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	.....	..	Dayton airless
Middletown	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
New Britain	..	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	.....	..	Cushion
New Haven	..	4	1	..	..	..	..	1	..	1	..	1	..	..	..	..	Aerial	4	Cushion
Delaware:																			
Wilmington	..	1	..	..	..	..	3	3	1	..	3	3	3	3	2	..	2	2	Swinehart
Georgia:																			
Albany	..	..	..	..	..	.	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Athens	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Airless
Atlanta	..	2	..	..	..	..	..	..	..	..	..	..	..	2	..	..	.....	..	.....
Columbus	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.....	..	Dayton airless
Macon	..	1	..	..	..	..	..	2	2	..	..	6	..	..	..	..	.....	..	.....
Savannah	..	2	..	..	..	1	..	4	..	..	..	7	..	..	..	..	.....	..	Solid tire
Idaho:																			
Lewiston	..	..	..	..	..	..	..	1	..	..	..	..	..	..	.	..	.....	..	Cushion
Illinois:																			
Aurora	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	.....	..	.....
Beardstown	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.....	..	Pneumatic
Bloomington	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..	..	.....	..	Goodrich
Danville	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Decatur	..	1	..	..	1	..	2	..	..	..	..	..	..	..	..	..	.....	..	Pneumatic
De Kalb	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless
East St. Louis	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	.....	..	.....
Elgin	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	Solid
Princeton	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Moline	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	Solid
Quincy	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Rockford	..	1	1	..	1	..	2	2	1	..	..	2	..	..	..	..	.....	..	Solid
Sterling	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Urbana	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Waukegan	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	Solid
Indiana:																			
Connersville	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
East Chicago	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	.....	..	Solid
Gary	1	..	1	..	3	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....

Richmond	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Rockport	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
South Bend	..	1	..	..	1	1	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Terre Haute	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Vincennes	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	.....	..	Solid
Iowa:																			
Cedar Falls	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Davenport	..	1	..	..	1	..	..	..	3a	..	..	..	..	..	..	..	Aerial	4	Solid, Goodrich, Firest
Des Moines	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Dubuque	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	.....	..	Solid
Manchester	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Marshalltown	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Sioux City	..	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	.....	..	.....
Kansas:																			
Atchison	..	..	..	..	..	..	1	1	..	..	..	1	..	..	..	..	.....	..	Not pneumatic
Independence	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	.....	..	Goodyear
Leavenworth	..	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	.....	..	.....
Manhattan	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Salina	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Cushion
Kentucky:																			
Louisville	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	.....	..	Solid
Shelbyville	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Louisiana:																			
Shreveport	..	1(1)	..	..	..	..	..	2	1	..	..	1	..	1	1	..	2	4 & 3	.....
Maine:																			
Brunswick	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..	..	.....	..	.....
Millinocket	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	.....	..	.....
Massachusetts:																			
Arlington	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	.....	..	Monarch spring
Brockton	..	1	1	..	..	..	1	..	..	..	..	..	..	..	..	2	.....	..	Solid b
Chelsea	..	..	..	..	..	..	1	1	..	..	..	1	1	1	..	..	.....	..	Motz demountable
Danvers	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	.....	..	.....
Medford	..	..	..	..	..	..	..	1	1c	..	..	..	..	..	..	..	.....	..	Dayton, Goodrch, Sewell
New Bedford	..	1	..	..	..	..	3	..	..	..	..	1	..	..	..	1	.....	..	.....
Newton	2	..	..	..	..	..	..	2	1	..	..	1	..	..	..	..	Aerial	3	Solid, cellular, pneumatic
Pittsfield	..	1	..	..	..	..	1	..	1d	..	..	..	..	..	..	..	.....	..	Solid
Quincy	1	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Revere	..	1	..	..	..	..	..	2	..	..	..	..	..	2	..	..	.....	..	.....
Somerville	..	1	..	..	..	1	2	..	..	..	..	..	..	..	..	..	.....	..	.....
Swampscott	..	..	..	..	..	1	2	2	..	..	..	1	..	..	..	..	.....	..	.....
Taunton	..	1	..	..	..	..	..	2	..	..	..	..	..	..	..	..	.....	..	.....
Waltham	1	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	.....	..	.....
Watertown	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Webster	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Winthrop	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	Solid
Michigan:																			
Battle Creek	..	1	..	..	..	..	1	..	1c	..	..	..	..	1	..	..	.....	..	Dayton airless
Flint	1	..	..	..	..	..	..	1	1d	..	..	..	..	..	..	1	.....	..	.....
Jackson	..	1	..	..	..	..	..	2	1	..	..	..	..	..	..	..	.....	..	Airless
Lansing	..	1	..	..	..	1	..	2	..	..	..	3	..	..	..	..	.....	..	Solid or cushion
Pontiac	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Minnesota:																			
Duluth	2	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Red Wing	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Rochester	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.....	..	Dayton airless
Minneapolis	1	4	1	..	..	..	..	5	..	..	..	..	..	1	..	..	2 H. & L.	..	Solid
St. Cloud	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
St. Paul	..	3	1	..	..	..	..	1	..	..	..	1	..	..	1	..	.....	..	.....
Mississippi:																			
Jackson	1	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	Aerial	4	Solid
Missouri:																			
Clinton	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Jefferson	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Kansas City	3	2	..	..	..	..	..	1	..	..	..	..	..	1	..	..	.....	..	.....
Kirksville	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
St. Joseph	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
St. Louis	..	2	..	..	..	..	..	..	2	..	..	3	..	..	..	1	.....	..	Motz cushion
Springfield	..	1	1	..	3	1	1	1	..	..	..	1	..	..	..	..	.....	..	Dayton airless
Webb City	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Montana:																			
Bozeman	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....

For foot notes see page **288.**

FIRE APPARATUS IN AMERICAN CITIES.—Table No. 2.—Motor Propelled Apparatus.—Continued.

City.	Chief's cars. With chemical tanks.	Chief's cars. Without chemical tanks.	Squad wagons. With chemical tanks.	Squad wagons. Without chemical tanks.	Hose wagons.	Chemical engines.	Chemical and hose.	Chemical and hose carrying ladders.	Hook and ladder trucks. Gasoline.	Hook and ladder trucks. Electric.	Gasoline pumping engines. Without hose or chemical.	Gasoline pumping engines. With hose.	Gasoline pumping engines. With chemical.	Gasoline pumping engines. With hose and chemical.	Gasoline propelled steam pumping engines.	Repair and service wagons.	Apparatus named on which tractors are used.	Number of wheels on tractors.	Kind of tires preferred for heavy motor apparatus.
Nebraska:																			
Columbus	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid e
Fremont	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Kearney	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Goodyear
Lincoln	..	1	..	..	..	..	..	1	..	..	..	1	..	..	..	..	.....	..	Cushion
Omaha	..	1	..	..	..	..	..	2	..	..	..	..	..	..	..	..	.....	..	Cushion
South Omaha	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
New Hampshire:																			
Manchester	..	1	1	..	..	..	..	..	2	..	..	..	..	..	..	..	.....	..	Solid
New Jersey:																			
Atlantic City	..	3	..	..	..	..	1	..	1	..	..	..	..	..	..	..	Horse drawn engine	..	.....
Dover	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
East Orange	..	..	..	..	2	..	5	5	..	..	..	..	..	..	..	1	.....	..	Firestone
Englewood	..	..	..	..	..	..	..	..	..	..	..	1f	..	..	..	..	.....	..	.....
Hackensack	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	Ladder truck	3	Firestone & Goodr
Irvington	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Not solid
Jersey City	..	1	..	..	..	..	1	..	..	..	1	..	..	..	..	..	1	2	Solid
Lambertville	..	..	..	..	..	..	2	..	1c	..	..	..	..	1	1	..	.....	..	Firestone
Morristown	..	..	..	..	2	1	..	..	1	..	..	1	..	..	1	..	Steam pumping eng.	4	.....
Paterson	..	3	..	..	3	..	..	1	2	..	..	2	..	..	5	2	5	2	.....
Passaic	..	2	..	..	..	..	..	5	2	..	..	1f	..	..	..	..	H. & L.	4	Solid
Princeton	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	.....	..	.....
Summit	..	..	..	..	1	..	1	1	..	..	..	..	..	1	..	..	.....	..	Solid
Trenton	..	2	..	..	2	1	..	..	2d	..	..	..	3	..	..	..	1	..	Goodrich, Fisk
Woodbridge	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	.....	..	.....
New York:																			
Amsterdam	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	.....	..	Solid
Auburn	..	1	..	..	..	2	..	..	..	..	..	..	..	..	..	..	.....	..	Hard
Binghamton	..	1	..	..	..	..	4	4	..	..	..	..	..	..	..	..	.....	..	Solid
Canandaigua	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Dobbs Ferry	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless, soli
Elmira	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Geneva	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Gloversville	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Goshen	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	.....	..	.....
Jamestown	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	.....	..	.....
Lestershire	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Malone	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Mt. Vernon	1	..	..	..	..	..	..	3	1h	..	..	..	..	..	1	..	Eng. and truck.	3	Solid b
Newburgh	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	.....	..	.....
New Rochelle	..	1	..	1	..	..	..	1	1	..	..	..	..	1	1	..	2	2 & 4	.....
Olean	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	.....	..	.....
Peekskill	..	1	..	..	..	..	..	2	..	..	..	1	..	..	..	..	.....	..	Cushion
Poughkeepsie	..	1	..	..	..	..	..	4	1	..	..	..	..	..	1	..	.....	..	.....
Rochester	4	2	..	..	..	..	2	..	..	..	..	..	..	..	..	..	.....	..	Solid
Saratoga Sprgs	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Firestn, Goodrch, Goody
Schenectady	..	1	..	..	..	..	3	..	1	..	1	..	..	..	2	..	1	..	Hard
Southampton	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	.....	..	Dayton airless
Syracuse	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Troy	..	2	..	..	1	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Utica	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Whitehall	..	1	..	..	2	..	..	..	..	..	..	..	..	1	..	..	.....	..	.....
Yonkers	..	3	..	..	..	..	..	3	1	..	..	..	..	1	..	..	.....	..	Solid
North Carolina:																			
Burlington	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Charlotte	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Greensboro	..	..	..	..	1	..	1	1	..	..	..	..	..	1	..	..	.....	..	.....
Raleigh	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	1	.....	..	Dayton airless
Salisbury	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Ohio:																			
Alliance	1	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	.....	..	.....
Ashtabula	..	1	..	..	..	..	..	2	..	..	..	..	..	1	..	..	.....	..	Firestone solid
Bryan	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Bucyrus	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Canton	1	..	1	..	..	3	6	6	1	..	..	..	2	2	..	1	.....	..	Solid
Cincinnati	2	5	10	..	..	..	1	..	..	..	..	..	..	..	2	..	.....	..	.....
Circleville	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	.....	..	Solid
Columbus	..	6	..	..	..	..	5	..	..	..	1	..	..	..	..	1	6	4	Solid

Conneaut	..	..	..	..	1	1	1	1	..	..	1	..	..	..	..	..	.....	..	Dayton airless
Delaware	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	.....	..	.....
East Cleveland	..	..	..	..	..	..	..	..	1	..	..	1	1	1	..	..	.....	..	Solid
East Liverpool	1	..	..	..	..	..	3	..	1	..	..	..	..	1	..	..	Aerial	4	Cushion
Elyria	1	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	.....	..	Solid
Lorain	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	.....	..	Solid
Mansfield	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Marietta	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.....	..	Swinehart
Marion	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	.....	..	Goodyear, Motz
Portsmouth	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	.....	..	Solid
Toledo	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Warren	..	..	..	..	..	..	..	1	..	..	..	..	..	1	1	..	.....	..	Solid
Oklahoma:																			
Ardmore	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Guthrie	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Pneumatic
Muskogee	..	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	.....	..	.....
Oklahoma City	..	2	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	Solid
Sapulpa	..	1	..	..	..	..	..	..	..	..	..	..	..	1	1	1	.....	..	Fisk
Tulsa	1	..	..	..	..	..	2	..	1	..	..	2	..	..	1	..	1	2	Solid
Oregon:																			
Astoria	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Salem	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Pennsylvania:																			
Altoona	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Beaver	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Bristol	..	1	..	..	..	..	..	2	..	..	..	..	..	..	..	..	.....	..	.....
Carlisle	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	.....	..	.....
Easton	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Edgewood	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Harrisburg	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Johnstown	..	1	..	..	..	..	..	1	..	..	..	..	..	1	..	..	.....	..	Solid or Dayton
Lansdowne	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.....	..	Airless
Meadville	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.....	..	Dayton airless
Nanticoke	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
New Brighton	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
New Castle	1	..	..	..	..	..	..	3	..	..	..	..	..	1	..	1	.....	..	Solid
Norristown	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
North East	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Oil City	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Pittsburgh	1	..	..	..	..	..	..	9	1	..	..	..	..	..	5	..	5 eng., H. & L.	2	.....
Pottsville	..	..	..	..	..	..	..	4	..	..	..	..	..	..	..	..	.....	..	.....
Reading	..	1	..	..	..	..	4	4	..	..	..	2	..	..	2	3	2	2 & 3	Solid
Scranton	1	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	.....	..	.....
Sunbury	..	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	.....	..	.....
West Chester	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	.....	..	Firestone
Wilkes-Barre	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Rhode Island:																			
East Providence	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Pawtucket	..	1	..	..	..	..	3	2	1	..	..	..	..	1	..	..	Ladder truck	2	Solid
Providence	..	1	..	..	..	..	5	2	..	..	..	..	..	..	..	..	.....	..	Fisk bolted on p matic e
Woonsocket	1	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	Ladder truck	2	Solid b
South Carolina:																			
Aiken	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Charleston	..	1(i)	..	..	..	..	..	1	..	..	..	1	..	..	..	..	.....	4	Solid
Florence	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Orangeburg	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Rock Hill	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless
Spartanburg	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	.....	..	Dayton airless
South Dakota:																			
Pierre	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Tennessee:																			
Chattanooga	..	2	..	..	..	1	..	..	..	..	..	1	..	..	..	..	.....	..	Dayton airless
Nashville	2	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.....	..	Dayton airless
Texas:																			
Beaumont	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Pneumatic
El Paso	..	1	..	..	..	..	..	1	..	..	..	..	..	1	..	..	.....	..	Dayton airless.
Fort Worth	..	1	..	..	..	..	..	2	..	..	..	2	..	..	..	..	.....	..	.....
Georgetown	..	..	..	..	1	1	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Paris	1	..	..	..	..	1	..	1	1	..	..	1	..	..	..	..	.....	..	Solid
Utah:																			
Ogden	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Salt Lake City	1	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	.....	..	Airless

Fot foot notes see page 288.

FIRE APPARATUS IN AMERICAN CITIES.—Table No. 2.—Motor Propelled Apparatus.—Continued.

City.	Chief's cars. With chemical tanks.	Chief's cars. Without chemical tanks.	Squad wagons. With chemical tanks.	Squad wagons. Without chemical tanks.	Hose wagons.	Chemical engines.	Chemical and hose.	Chemical and hose carrying ladders.	Hook and ladder trucks. Gasoline.	Hook and ladder trucks. Electric.	Gasoline pumping engines. Without hose or chemical.	Gasoline pumping engines. With hose.	Gasoline pumping engines. With chemical.	Gasoline pumping engines. With hose and chemical.	Gasoline propelled steam pumping engines.	Repair and service wagons.	Apparatus named on which tractors are used.	Number of wheels on tractors.	Kind of tires preferred for heavy motor apparatus.
Virginia:																			
Newport News	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Roanoke	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	.....	..	Solid
Staunton	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	.....	..	.....
Washington:																			
Ellensburg	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton cushion
Everett	1	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..	.....	..	Dayton airless.
Hoquiam	..	..	..	..	..	..	..	1	..	..	..	1	..	..	..	..	.....	..	Solid g
North Yakima	..	1	..	..	1	1	..	1	1d	..	..	1	..	..	..	..	.....	..	Swinehart, Goodrich
Olympia	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Goodyear
Snohomish	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Spokane	..	3	..	..	3	1	2	3	1	..	..	1	..	..	2	..	Engine & truck	4	Goodyear, Motz
Vancouver	..	..	..	..	..	..	1	1	..	..	1	..	..	1	..	..	.....	..	Goodyear
West Virginia:																			
Benwood	..	..	2	..	2	..	..	2	..	..	..	..	..	..	..	..	.....	..	.....
Keyser	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	.....	..	.....
Wisconsin:																			
Eau Claire	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	Solid
Janesville	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Merrill	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
Milwaukee	..	8	1	..	..	..	1	..	1	..	..	..	..	..	..	..	.....	..	Solid
Oconomowoc	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	.....	..	.....
Oshkosh	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..	..	.....	..	Solid
Racine	1	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	.....	..	Solid
Superior	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	1	Aerial truck	4	Solid
Canada:																			
Hamilton, Ont	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	..	.....	..	.....
London, Ont	..	1	..	..	..	..	..	2	..	..	..	..	..	..	..	..	.....	..	.....
Sault Ste. Marie, Ont.	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	.....	..	.....
Victoria, B. C.	1	1	..	..	1	1	2	..	1	..	..	..	..	..	2	..	.....	..	Solid
Windsor, Ont	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	.....	..	Solid

a—One carries 950 feet of hose. b—For heaviest; pneumatic for medium and light. c—carries chemical. d—Gasoline-electric aerial. e—Rear tires double. f—Carries ladders. g—Cushion for medium weight. h—With water tower attachment.
Figures in parenthesis indicate apparatus in reserve.

Summary of Expenses of the Charleston, S. C., Fire Department by Companies, from January 1st to December 31st, 1912.

	Pay roll.	Forage.	Coal & wood.	Engine & fire alarm telegraph supplies.	House & stable utensils.	Repairs to apparatus.	Repairs to heaters and installing heater.	Repairs to houses.	Repairs to harness.	Horseshoeing & medicine.	Telephones.	Gas, and current for fire alarm battery.	Chief's expenses to Birmingham, Ala., and chief's convention at Denver, Col.	Fire alarm boxes.	New wheels, rubber tires & brake for Engine No. 5.	Trussed ladder truck No. 1.	Tiller Truck No. 1.	Total.
Chief, assistant, driver and permanent firemen	$5,110.00	.....	.....	$182.18	.....	$441.47	.....	$25.20	.....	.....	.....	.....	$150.45	.....	.....	.....	.....	$5,909.30
Engine No. 1	5,364.00	$439.96	.....	19.36	$5.33	9.95	.....	4.25	$3.90	$35.95	.....	$52.25	.....	.....	.....	.....	.....	5,934.95
Engine No. 2	5,714.87	.....	.....	214.90	8.92	216.97	$4.45	53.36	.....	.....	.....	53.89	.....	.....	.....	.....	.....	6,257.36
Combination Co. No. 3, chemical	7,709.36	396.20	.....	138.93	10.65	143.06	78.67	50.48	8.90	17.15	.....	53.89	.....	.....	.....	.....	.....	8,607.29
Combination Co. No. 3, steamer	.....	.....	.....	.....	.....	160.83	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	160.83
Combination Co. No. 3, aerial truck	.....	40.07	.....	.....	.....	26.50	.....	.....	8.85	13.25	.....	.....	.....	.....	.....	.....	.....	88.67
Engine No. 4	5,095.00	417.17	.....	47.91	12.62	24.75	2.13	9.14	9.25	38.50	.....	63.10	.....	.....	.....	.....	.....	5,719.57
Engine No. 5	3,392.64	291.95	.....	22.84	3.73	.....	1.43	6.14	16.25	17.65	.....	37.85	.....	.....	$733.34	.....	.....	4,523.82
Engine No. 6	6,764.00	532.86	.....	54.87	11.01	23.38	2.45	26.61	8.25	53.03	.....	59.81	.....	.....	.....	.....	.....	7,536.27
Engine No. 7	5,089.00	402.37	.....	45.34	17.23	15.40	.45	10.30	14.95	44.95	.....	45.17	.....	.....	.....	.....	.....	5,685.16
Engine No. 8	6,530.00	522.61	.....	65.69	12.27	16.68	7.83	36.09	2.75	54.28	.....	48.86	.....	.....	.....	.....	.....	7,297.06
Truck No. 1	5,319.50	279.02	.....	26.39	3.39	45.40	2.40	299.44	17.15	30.70	.....	32.68	.....	.....	.....	$69.00	$135.00	6,260.07
Supply wagon	492.00	298.66	.....	16.53	8.25	4.90	.....	.....	.....	24.20	.....	62.47	.....	.....	.....	.....	.....	907.01
Fire alarm telegraph	1,385.00	149.49	.....	1.15	.....	151.46	.....	.....	.....	13.20	.....	58.81	.....	$147.75	.....	.....	.....	1,906.86
Supt. of horses	300.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	300.00
Reserve engines	.....	.....	.....	.....	.....	75.73	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75.73
Department general use	.....	354.16	$982.70	13.88	.....	109.02	.....	135.33	.....	15.51	$413.40	.....	.....	.....	.....	.....	.....	11,078.60
Total	$58,265.37	$4,124.52	$982.70	$849.97	$93.40	$1,465.50	$99.81	$656.34	$90.25	$358.37	$413.40	$568.78	$150.45	$147.75	$733.34	$69.00	$135.00	$78,258.55

FIRE APPARATUS IN AMERICAN CITIES.

Table No. 3.—Hand Drawn Apparatus and Miscellaneous Data.

City	Hand reels	Other hand drawn apparatus	Serviceable hose on hand, ft.	No. of public alarm boxes	Are oxygen helmets used?	Are pulmotors used?	Are cellar pipes used?	Are searchlights used?	Training school for firemen?
Alabama:									
Florence	..		2,800	...	No	No	No	No	No
Gadsden	2		3,000	a	No	No	No	No	No
Montgomery	..		10,000	70	No	No	3	No	No
Opelika	1		2,100	...	No	No	No	1	No
Talladega	2		3,000	...	No	No	No	No	No
Arkansas:									
Fayetteville	1		3,000	...	No	No	No	No	Yes
California:									
Alameda	..		9,000	47	Yes	No	Yes	Yes	No
Berkeley	..		13,000	62	Yes	No	Yes	Yes	...
Fresno	..		14 500	168	No	No	3	1	Yes
Hanford	..		2,800	19	No	No	No	No	No
Long Beach	..		3,000	27	Yes	Yes	...	Yes	No
Los Angeles	13	2 H. & L., 3 chemicals	91,750	418	Yes	...	Yes	Yes	Yes
Merced	2		3,000	None	No	No	No	No	No
Modesto	2		3,600	21	No	No	No	No	No
Oakland	..		41,000	228	Yes	...	Yes	...	No
Petaluma	5	Hand engine	4,600	21	...	...	1	1	...
Red Bluff	1	Ladder truck	1,750	20	No	No	No	No	No
Redlands	..		3,600	...	No	No	No	No	No
Riverside	2		6,000	28	...	...	...	...	...
San Bernardino	2		5,000	47	No	No	No	No	No
Santa Clara	3	H. & L.	2,750	17	Yes	...	...	...	...
Santa Monica	1		5.000	...	...	...	...	...	...
Santa Rosa	..		3,900	27	1	...	...	...	...
Stockton	..		11,600	43	Yes	...	Yes	...	No
Colorado:									
Boulder	1	City service truck	6,000	14	No	No	Yes	Yes	No
Colorado Springs	3		8,000	63	Yes	No	Yes	...	c
Grand Junction	2		2,900	None	No	No	1	No	No
Greeley	(3)	H. & L.	3,500	18	No	Yes	Yes	...	No
Pueblo	..		14,000	80	Yes	No	Yes	...	No
Rocky Ford	..		2,300	...	...	...	...	...	...
Salida	..		1,500	8	No	...	...	...	No
Trinidad	..		3,200	14a	Yes	No	2	1	No
Victor	2		3,500	12	No	No	No	1	No
Connecticut:									
Danbury	1	6 hose carriages	9,000	39	No	No	2	No	No
Middletown	..		5,000	25	No	No	No	No	No
New Britain	..		10,000	73	No	No	Yes	Yes	Yes
New Haven	..		28,000	168	No	No	Yes	Yes	Yes
Putnam	2		4,200	15	No	No	No	No	No
Willimantic	3		4,000	28	No	No	1	No	No
Delaware:									
Wilmington	..		7,000	92	No	No	No	2	No
Georgia:									
Albany	..		5,000	26	No	No	Yes	Yes	No
Athens	..		4,000	38	...	...	Yes	...	...
Atlanta	..		25,000	117	No	No	Yes	Yes	Yes
Brunswick	..		4,000	24	No	No	No	No	No
Columbus	..		12,750	33	...	...	Yes	Yes	...
Cuthbert	3		....	a	No	No	No	No	No
Elberton	1		2,300	5	No	No	No	No	No
Macon	..		13,000	100	No	No	Yes	Yes	No
Newnan	..		2,500	15	Yes	No	No	No	No
Savannah	..		15 000	105	Yes	...	Yes	Yes	...
Idaho:									
Idaho Falls	..	Ladder cart	2,500	...	No	...	...	...	No
Lewiston	6	H. & L.	3,550	37	No	No	Yes	No	No
Wallace	2		2,900	20	No	No	1	...	Yes
Weiser	3	H. & L. & 60-gal. chem.	2,000	...	...	...	...	...	No
Illinois:									
Aurora	..		8,000	100	No	No	Yes	Yes	...
Beardstown	..		2,200	a	No	No	No	No	No
Belleville	..		3,000	21	No	No	1	1	No
Belvidere	..		4,000	...	...	...	1	...	No
Bloomington	..		5,000	56	Yes	Yes	Yes	Yes	No
Canton	..		4 500	None	No	No	1	No	No
Chester	3	H. & L.	1,500	...	...	...	...	...	...
Danville	..		7,000	66	No	No	No	No	No
Decatur	..		8,850	74	No	No	No	No	No
De Kalb	..		3,500	36	No	Yes	1	2	No
E. St. Louis	1		15,000	98	...	...	1	1	...
Elgin	..		5,000	b	No	No	1	No	No
Fairbury	2		2,000	...	No	No	No	No	No
Galena	1		2,000	...	No	No	No	No	No
Harvey	3		2,700	21	No	No	No	No	No
Moline	1		7 200	82	Yes	...	Yes	Yes	No
Mt. Olive	4	Hand engine	2,000	None	No	No	No	No	No
Monmouth	..	Hose cart	3,800	15	1	...	...	...	...
Mt. Vernon	..		900	9	No	No	No	No	No
Naperville	..		2,800	None	No	No	No	No	No
Princeton	..		2,500	...	No	No	No	No	No
Quincy	..		12,000	...	...	...	...	...	...
Rockford	..		12,000	83	1	...	3	6	Yes
Staunton	2		2,000	2	...	...	...	...	...
Sterling	..		4,000	18	Yes	No	Yes	Yes	No
Urbana	..		....	...	Yes	...	Yes	Yes	...
Vandalia	3	H. & L.	2,500	...	...	...	...	...	...
Waukegan	..		2,600	52	No	No	Yes	No	No
Westville	..	2 chemicals	1,500	...	...	...	...	...	...
Indiana:									
Boonville	1		2,000	...	...	...	...	...	...
Connersville	1		5,250	32	No	No	No	No	No
East Chicago	..		5,300	36	No	No	2	2	No
Gary	2	H. & L., 3 chemicals	10,000	45	Yes	Yes	Yes	Yes	Yes
Kendallville	..		2,300	a	No	No	No	No	No
Kokomo	..		6,000	28	No	No	Yes	Yes	No
Logansport	..		6,500	62	No	No	1	No	No
Madison	..		10,000	19	...	...	...	...	...
Michigan City	2		6,000	38	...	...	Yes	...	Yes
Mt. Vernon	1		1,600	None	No	No	No	No	No

For foot notes see page 294.

FIRE APPARATUS IN AMERICAN CITIES.

Table No. 3.—Hand Drawn Apparatus and Miscellaneous Data. —Continued.

City	Hand reels	Other hand drawn apparatus	Serviceable hose on hand, ft.	No. of public alarm boxes	Are oxygen helmets used?	Are pulmotors used?	Are cellar pipes used?	Are searchlights used?	Training school for firemen?
Portland	..	.....	1,800	a	No	No	No	No	No
Rockport	..	.....	1 000	None	No	No	No	No	No
Shelbyville	..	.....	3,000	36	No	No	No	No	No
South Bend	..	.....	20,000	161	No	Yes	Yes	Yes	No
Terre Haute	..	.....	1,400	107	No	No	Yes	Yes	No
Union City	..	.....	2,300	None	No	No	No	No	No
Vincennes	..	.....	3,000	44	No	No	No	No	No
Warsaw	3	H. & L.	3,000	...	No	No	No	No	No
Washington	..	.....	5,200	26	No	No	No	No	No
Iowa:									
Cedar Falls	..	.....	2,500	...	No	No	No	No	No
Davenport	..	.....	13,000	83a	Yes	No	Yes	2	Yes
Des Moines	..	.....	26,000	86	No	No	6	No	No
Dubuque	..	.....	12,000	59a	1	...	2	...	No
Fairfield	2	.....	2,500	...	No	No	No	No	No
Keokuk	..	.....	6,000	1	No	No	No	1	No
Manchester	3	.....	2,500	...	No	No	No	No	No
Marshalltown	..	.....	4,000	24	Yes	Yes	Yes	Yes	...
Sioux City	..	.....	14,000	50	...	...	Yes	...	...
Kansas:									
Atchison	..	.....	4,800	...	...	...	Yes	Yes	...
Hiawatha	2	H. & L. and hose wagon	2,150	None	No	No	No	No	No
Independence	..	.....	2,000	...	Yes	...	...	...	Yes
Leavenworth	..	.....	4,000	None	No	1	2	1	Yes
Manhattan	1	.....	2,300	...	...	...	...	...	No
Parsons	..	.....	4,000	24	No	No	Yes	No	No
Salina	..	.....	4,000	None	Yes	No	Yes	1	No
Winfield	..	.....	1,800	...	Yes	Yes	...	...	No
Kentucky:									
Bowling Green	2	.....	3,500	17	No	No	Yes	No	No
Louisville	..	.....	35,000	398	No	No	Yes	Yes	No
Shelbyville	(2)	.....	1,700	8	No	No	Yes	Yes	No
Louisiana:									
Shreveport	1	3 coal wagons	9,500	67	No	1	1	No	No
Thibodaux	1	Hand engine	1,250	None	...	...	...	...	...
Maine:									
Biddeford	..	.....	9,000	26	...	...	1	...	...
Brunswick	5	.....	6,000	23	No	No	No	No	No
Hallowell	..	.....	4,200	...	...	...	...	...	...
Millinocket	2	.....	4,000	16	No	No	No	No	No
Norway	2	3 hose carts, H. & L., chem., hand tub	3,000	8	...	...	...	...	...
Saco	2(1)	.....	5,000	19	...	...	...	...	...
Skowhegan	..	2 hose wagons	3,500	12	No	No	No	No	No
South Paris	..	Hand engine	2,500	...	...	...	...	...	...
Maryland:									
Cumberland	2	.....	5,000	21	No	1	No	No	No
Massachusetts:									
Arlington	..	.....	6,000	41	No	No	1	2	No
Ayer	..	Hand tub	3,500	20	No	Yes	No	No	...
Brockton	2	Hand engine	14,000	128	Yes	Yes	Yes	Yes	Yes
Cambridge	..	.....	16,000	196	...	...	Yes	Yes	No
Chelsea	..	.....	9 000	58	Yes	Yes	Yes	Yes	No
Danvers	..	.....	12,000	37	No	No	No	No	No
Falmouth	..	.....	....	3	...	...	...	...	...
Foxboro	2	.....	3,600	23	No	No	No	No	No
Marlboro	..	.....	8,000	39	...	...	2	...	...
Medford	..	.....	9,000	56	No	No	2	4	No
New Bedford	..	.....	19,500	165	...	...	3	...	...
Newton	..	.....	15,000	165	No	No	Yes	Yes	No
Pittsfield	..	.....	10,000	68	No	No	Yes	Yes	Yes
Quincy	2	.....	10,000	133	No	No	1	No	No
Revere	..	.....	6,500	56	...	Yes	1	Yes	No
Somerville	..	.....	11,000	121	No	No	Yes	Yes	No
Swampscott	..	.....	4,000	30	No	No	No	Yes	No
Taunton	3	.....	13,500	126	No	No	Yes	Yes	No
Waltham	..	.....	11,000	80	No	No	Yes	No	No
Warren	2	.....	4,000	14	No	No	...	...	No
Watertown	..	.....	4,000	48	No	No	No	Yes	No
Webster	..	.....	4,500	26	...	...	...	...	...
Winthrop	..	.....	3,000	48	No	No	Yes	Yes	No
Michigan:									
Alma	1	.....	3,500	15	...	...	...	...	...
Battle Creek	..	.....	10,000	700	No	No	Yes	Yes	No
Bessemer	1	.....	5,000	a	No	No	Yes	No	No
Escanaba	2	.....	3,500	30	No	...	1	...	No
Flint	..	.....	8,500	70	1	...	Yes	Yes	No
Greenville	..	.....	2,500	...	Yes	...	...	...	...
Jackson	..	.....	15,000	113	Yes	Yes	Yes	Yes	Yes
Lansing	..	.....	8,900	73	No	No	3	2	No
Marine City	3	H. & L.	2,500	25	No	No	No	No	No
Menominee	(2)	.....	5 500	75	No	No	Yes	No	No
Mt. Clemens	1	.....	4,000	36	No	...	...	1	No
Muskegon	..	.....	12,000	46	No	No	Yes	Yes	No
Otsego	2	.....	2,500	14	...	...	...	...	...
Petoskey	1	.....	4,000	15	No	No	2	No	No
Pontiac	..	.....	4,800	62	Yes	Yes	Yes	...	No
St. Joseph	1	.....	3,000	...	No	No	...	...	No
Sault Ste Marie	3	Chemical	3,000	35	No	No	1	...	No
South Haven	..	.....	2,000	a	...	...	...	...	c
Traverse City	(4)	H. & L.	5,000	44	No	No	1	No	No
Minnesota:									
Alexandria	3	.....	2,000	...	...	...	1	...	No
Brainerd	3	H. & L.	4 000	...	No	No	2	No	No
Cloquet	4	.....	4,000	16	No	No	1	No	No
Detroit	..	.....	1,700	...	...	...	...	...	...
Duluth	4	.....	22,400	163	No	No	Yes	...	Yes
East Gr. Forks	..	.....	3,500	...	...	...	1	...	...
Hastings	3	.....	2,500	...	No	No	No	No	No
Litchfield	..	.....	1,900	...	...	...	Yes	...	No

For foot notes see page 294.

FIRE APPARATUS IN AMERICAN CITIES.

Table No. 3.—Hand Drawn Apparatus and Miscellaneous Data.—Continued.

City	Hand reels	Other hand drawn apparatus	Serviceable hose on hand, ft.	No. of public alarm boxes	Are oxygen helmets used?	Are pulmotors used?	Are cellar pipes used?	Are searchlights used?	Training school for firemen?
Mankato	4	H. & L.	6,000	19	No	Yes	Yes	No	Yes
Minneapolis	..	.....	65,650	416	Yes	Yes	Yes	Yes	Yes
Owatonna	..	.....	2,500	18	No	No	2	1	No
Red Wing	3	.....	7,300	32	No	No	Yes	No	No
Rochester	..	.....	4,000	19	No	No	1	1	...
St. Cloud	..	Hose cart	3,000	19	...	...	...	1	...
St. Paul	..	.....	56,000	203	...	...	Yes	Yes	No
Sauk Center	..	.....	2,500	...	...	...	...	...	...
Shakopee	..	.....	2,500	...	No	No	No	No	No
Stillwater	..	.....	5 000	29	No	No	Yes	Yes	No
Two Harbors	2	.....	3,000	...	...	...	...	...	...
Willmar	..	.....	2,000	...	...	...	...	...	...
Worthington	..	.....	2,500	...	...	...	...	...	...
Mississippi:									
Brookhaven	4	.....	2,000	None	No	No	No	No	No
Corinth	5	.....	1,250	...	No	No	No	No	No
Greenville	..	.....	5,450	22	No	No	No	No	No
Hattiesburg	..	.....	3,600	19	No	No	No	No	No
Jackson	..	.....	6,500	32	Yes	Yes	No	Yes	No
Laurel	..	.....	5,000	...	...	...	...	...	...
Port Gibson	3	H. & L.	1,500	None	No	No	No	No	No
Vicksburg	..	.....	6 000	30	No	No	No	No	No
Yazoo City	..	.....	4,000	20	No	No	No	No	No
Missouri:									
Carthage	1	.....	2,500	...	...	...	1	...	...
Chillicothe	..	.....	2,500	a	...	...	1	...	...
Clinton	..	.....	2,300	None	No	No	No	1	No
Fulton	1	.....	1,500	None	No	No	No	No	No
Hannibal	..	.....	5,000	None	No	No	Yes	Yes	No
Jefferson	3	H. & L.	3,000	None	Yes	No	Yes	Yes	No
Kansas City	1	.....	49,000	150	Yes	Yes	Yes	Yes	Yes
Kirksville	1	.....	1,600	None	No	No	No	No	No
Maryville	..	.....	2,000	a	No	No	1	1	No
Monroe	..	.....	700	None	No	No	No	No	No
Pleasant Hill	2	H. & L.	1,000	None	No	No	No	No	No
Pierce City	b	.....	2,000	None	Yes	...	...	...	...
Rich Hill	..	.....	1,400	None	No	No	No	No	No
St. Joseph	..	.....	20 000	63	No	No	Yes	No	No
St. Louis	..	.....	100,000	1,400	No	No	Yes	Yes	No
Springfield	..	.....	10,000	74	....	...	Yes	Yes	Yes
Washington	6	2 H. & L., 1 hand pump	2,000	a	No	No	No	No	No
Webb City	1	.....	4,000	None	No	No	1	2	No
Montana:									
Bozeman	3	.....	3,000	20	Yes	No	No	Yes	No
Kalispell	..	.....	2,200	...	No	No	No	No	No
Red Lodge	1	.....	2,400	...	No	No	No	No	No
Nebraska:									
Alliance	4	2 H. & L.	4,500	a	...	...	...	...	No
Ashland	3	.....	....	...	...	...	3	1	...
Beatrice	4	.....	3,000	None	No	No	1	1	No
Blair	..	.....	2.000	...	...	...	...	...	No
Columbus	3	.....	2,500	a	Yes	No	1	Yes	No
Fremont	..	.....	5,000	...	...	...	...	...	...
Grand Island	4	H. & L.	3,600	20	1	No	No	...	Yes
Hastings	..	.....	4,000	None	Yes	...	Yes	No	No
Havelock	3	H. & L., 2 chemical	1,600	...	...	...	...	...	...
Kearney	4	.....	3 500	...	No	No	No	No	No
Lincoln	..	.....	9,500	40	...	...	Yes	...	...
Nebraska City	2	.....	2,400	...	...	...	...	...	...
Omaha	..	.....	30,000	110	1	...	5	...	...
Red Cloud	3	.....	1,500	None	No	No	No	No	No
Schuyler	..	3 hose carts	1,500	None	No	No	No	No	No
So. Omaha	..	.....	7,000	13	Yes	No	No	No	No
Wahoo	3	Chemical	3,000	2	...	...	...	...	...
New Hampshire:									
Concord	..	2 hand tubs	15,000	46	No	No	Yes	No	No
Dover	..	Chemical	8,000	40	No	...	1	...	No
Manchester	..	.....	28,200	97	No	No	Yes	Yes	No
Nashua	..	.....	11,000	57	No	No	Yes	No	Yes
New Jersey:									
Atlantic City	..	.....	18,000	105	...	...	...	Yes	...
Boonton	2	.....	2,400	None	...	...	...	1	...
Bordentown	3	H. & L.	2,400	None	...	...	...	...	...
Burlington	..	.....	6,000	22	No	No	No	No	No
Dover	7	.....	5,000	24	No	No	No	No	No
East Orange	..	.....	5,000	97	No	No	No	No	No
Englewood	2	.....	....	...	...	...	...	1	Yes
Flemington	2	.....	2,000	30	No	No	No	No	No
Hackensack	..	.....	6,500	38	Yes	...	Yes	Yes	No
Harrison	(2)	.....	6,400	23	No	No	3	...	No
Irvington	..	.....	2,500	40	No	No	No	No	No
Jersey City	..	.....	30,000	273	No	No	4	No	Yes
Keyport	..	.....	4,000	...	No	...	...	1	No
Lambertville	..	.....	2,000	None	No	No	No	3	No
Morristown	..	.....	6,000	23	No	No	3	2	No
Passaic	..	.....	8,000	93	...	...	2	Yes	No
Paterson	..	.....	25,000	185	...	Yes	Yes	Yes	Yes
Princeton	..	.....	2,800	22	...	1	...	...	No
Prospect Park	1	.....	1,000	3	No	No	Yes	No	No
Rutherford	..	.....	4,000	24	No	No	1	No	No
Salem	..	.....	5 000	...	No	No	No	No	No
Summit	1	.....	7,500	30	No	...	4	3	No
Trenton	..	.....	22,000	195	Yes	Yes	Yes	Yes	Yes
Wharton	2	H. & L., chemical	750	...	...	...	...	...	...
Woodbridge	1	.....	3,000	a	No	No	No	...	...
New Mexico:									
Raton	1	.....	2,300	...	...	...	...	...	...
New York:									
Addison	6	H. & L., chemical	2,500	a	No	No	No	No	No
Amsterdam	3	.....	4,000	63	No	No	4	3	...
Auburn	..	.....	8,500	69	Yes	No	Yes	Yes	Yes

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FIRE APPARATUS IN AMERICAN CITIES.

Table No. 3.—Hand Drawn Apparatus and Miscellaneous Data.—Continued.

City	Hand reels	Other hand drawn apparatus	Serviceable hose on hand, ft.	No. of public alarm boxes	Are oxygen helmets used?	Are pulmotors used?	Are cellar pipes used?	Are searchlights used?	Training school for firemen?
Bath	..	.....	2,500	...	...	...	...	...	...
Binghamton	..	.....	12,000	114	No	No	Yes	Yes	No
Canajoharie	4	H. & L.	4,000	16	...	...	...	...	...
Canandaigua	..	.....	5,000	29	No	1	No	No	No
Canisteo	4	H. & L., chemical	3,000	None	No	No	No	No	No
Canton	..	.....	3,000	a	...	...	...	...	...
Cohoes	1	.....	9,500	43	No	No	Yes	No	No
Cortland	1(4)	.....	7,500	43	No	No	Yes	No	No
Delhi	6	2 H. & L., 2 hand pumps	2,800	None	No	No	No	No	No
Depew	4	.....	8,000	16	...	...	...	...	...
Deposit	2	Ladder	1,500	a	No	No	No	No	No
Dobbs Ferry	2	.....	3,000	9	No	No	No	2	No
Elmira	..	.....	7,600	74	...	...	...	...	Yes
Fort Plain	5	.....	6,000	4	...	...	...	...	...
Geneva	4	.....	6,500	36	No	No	Yes	No	No
Gloversville	(1)	.....	6,500	48	Yes	No	Yes	No	Yes
Goshen	1	Hand eng., hose wagon	4,200	12	No	No	No	1	No
Green Island	..	.....	2,200	None	No	No	No	No	No
Homer	3(2)	H. & L.	2,500	a	No	No	No	No	No
Hornell	3	.....	6,000	35	No	No	Yes	No	No
Jamestown	..	.....	8,000	82	Yes	...	Yes	Yes	No
Johnstown	1(3)	.....	4,800	33	No	No	Yes	No	No
Keeseville	2	H. & L.	1,600	None	No	No	No	No	No
Lancaster	..	.....	3,000	13	No	No	No	No	No
Le Roy	1	2 hose carts	2 000	12	...	...	...	...	...
Lestershire	..	.....	3,000	26	No	No	Yes	No	No
Little Falls	..	.....	6,000	29	No	No	Yes	...	...
Lowville	6	.....	3,500	None	No	No	Yes	No	No
Malone	1	.....	5,000	40	No	No	Yes	No	No
Mt. Vernon	..	.....	6,000	48	No	1	4	6	c
Newburgh	..	.....	9,350	42	No	1	No	1	No
New Rochelle	..	Chemical	6,000	72	...	...	2	4	...
No. Tonowanda	..	.....	11,000	29	...	...	...	...	...
Ogdensburg	..	.....	5,000	38	No	No	1	1	No
Olean	2	.....	9,000	45	1	...	...	...	...
Oswego	..	.....	7,000	51	No	1	2	...	No
Peekskill	..	.....	5,200	28	1	1	1	2	No
Poughkeepsie	..	.....	8,500	50	No	Yes	No	2	No
Rochester	..	.....	65,450	353	No	No	Yes	No	Yes
Rome	..	.....	9,800	45	No	...	3	...	No
Saratoga Spgs.	..	.....	5,200	44	No	No	Yes	No	No
Schenectady	..	.....	20,000	100	Yes	...	Yes	Yes	Yes
Solvay	4	Hose & ladder cart	3,100	16	No	No	No	No	No
Southampton	..	.....	5 500	24	No	No	Yes	Yes	No
Syracuse	..	.....	26,000	194	...	...	Yes	Yes	Yes
Troy	1	.....	28,000	133	No	No	3	3	No
Utica	..	.....	17,400	134	...	...	6	6	Yes
Waterloo	..	H. & L., 6 hose carts	4,000	...	...	...	...	...	...
Whitehall	2	H. & L.	5,500	20	...	...	Yes	Yes	No
Yonkers	6	Chemical	16,000	172	No	No	3	No	Yes
North Carolina:									
Burlington	2	.....	2,000	a	No	No	No	No	No
Charlotte	1	.....	6,500	53	Yes	...	Yes	Yes	No
Elizabeth City	..	.....	2,500	14	No	No	No	No	No
Greensboro	..	.....	50 000	...	No	No	Yes	Yes	No
Henderson	(4)	.....	2,600	...	No	No	No	No	No
Mooresville	2	.....	2,000	None	No	No	No	No	No
Raleigh	..	.....	6,000	51	No	No	1	2	Yes
Reidsville	2	.....	1,500	None	No	No	No	No	No
Salisbury	1	.....	3,200	16	No	No	No	No	No
North Dakota:									
Dickinson	3	H. & L.	1,500	...	No	No	Yes	No	No
Garrett	2	.....	1,000	a	No	No	No	No	No
Grand Forks	..	.....	5,000	30	...	...	4	...	...
Mandan	4	H. & L.	1,500	...	...	...	...	...	No
Ohio:									
Alliance	..	.....	4,500	71	Yes	...	Yes	Yes	Yes
Ashland	..	.....	....	...	No	No	No	Yes	No
Ashtabula	..	.....	4,000	None	No	No	No	No	No
Bellaire	4(1)	H. & L., chemical	4,000	25	No	No	2	No	No
Bellefontaine	..	.....	3,000	13	...	...	...	...	...
Bellevue	..	.....	2,600	...	...	...	...	...	...
Bryan	..	.....	2,750	None	No	No	No	No	No
Bucyrus	1	.....	3,600	17	Yes	...	Yes	Yes	...
Canal Dover	(2)	.....	2,500	None	No	No	1	No	No
Canton	..	.....	12,000	118	No	No	1	5	Yes
Cincinnati	..	.....	100,000	685	No	No	Yes	Yes	No
Circleville	..	.....	2,800	24	No	No	No	1	No
Columbus	..	.....	36,000	261	No	No	Yes	Yes	No
Conneaut	..	.....	4,000	40	...	...	1	2	Yes
Covington	3	2 steamers, H. & L.	2,200	None	No	No	No	No	No
Delaware	..	.....	4,000	...	No	No	Yes	Yes	No
Dennison	7	H. & L. chemical	3,500	None	No	No	No	No	No
East Cleveland	..	.....	2,200	30	No	No	No	No	No
East Liverpool	1	.....	7,000	76	Yes	...	Yes	Yes	Yes
Elyria	..	.....	5 250	15	...	...	...	...	...
Galion	2	.....	2,000	24	No	No	2	1	No
Gallipolis	..	.....	....	...	...	...	1	...	No
Jackson	..	.....	1,600	...	...	...	...	...	...
Kenton	..	.....	3,000	26	...	...	Yes	Yes	No
Lima	1	.....	8,000	54	Yes	...	2	No	...
Lorain	..	.....	12,000	None	No	No	Yes	Yes	No
Mansfield	..	.....	7,000	70	...	...	...	...	...
Marietta	..	.....	5,000	24	Yes	No	Yes	No	No
Marion	..	.....	5,700	43	No	No	2	2	No
Mt. Vernon	..	.....	3,000	...	No	No	Yes	No	No
Napoleon	..	.....	2,300	...	No	No	No	No	No
Nelsonville	1	.....	2,100	...	No	No	No	Yes	Yes
Newark	..	.....	6,500	28	No	No	1	No	No
Oberlin	1	.....	3,200	...	No	No	No	No	No
Paulding	2	.....	1,000	None	No	No	No	No	No
Port Clinton	3	.....	2,800	...	No	No	No	No	No
Portsmouth	2	.....	5,000	75	No	No	Yes	No	No
Ravenna	..	.....	2,200	...	...	...	...	...	...
St. Bernard	3	.....	3,000	25	...	...	...	...	...
St. Marys	1	.....	1,800	None	No	No	No	No	No
Salem	3	H. & L.	3,500	a	No	No	No	No	No
Tiffin	(3)	.....	4,500	34	1	No	1	No	No

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FIRE APPARATUS IN AMERICAN CITIES.

Table No. 3.—Hand Drawn Apparatus and Miscellaneous Data.—Continued.

City	Hand reels	Other hand drawn apparatus	Serviceable hose on hand, ft.	No. of public alarm boxes	Are oxygen helmets used?	Are pulmotors used?	Are cellar pipes used?	Are searchlights used?	Training school for firemen?
Toledo	..		32,000	300	No	No	6	No	c
Toronto	2		2,000	None	No	No	No	No	No
Warren	..		4,500	22	Yes	No	Yes	Yes	Yes
West Park	8		4,000	None	No	No	No	No	No
Wilmington	..		1,500	...	No	No	No	No	No
Oklahoma:									
Ardmore	..		5,000	None	No	No	No	No	No
Durant	..		2,000	None	No	No	No	No	No
Guthrie	..		7,100	a	1	...	...	...	Yes
McAlester	..		4,000	16	No	No	1	No	No
Mangum	..		2,500	...	...	...	...	...	...
Muskogee	..		8,250	48	Yes	No	Yes	Yes	No
Nowata	..		1,200	None	No	No	No	No	No
Oklahoma City	..		.....	136	...	...	...	...	No
Pawhuska	2		1,700	...	...	...	...	...	Yes
Ponca City	2		2,300	...	No	No	No	...	Yes
Sapulpa	1		4,000	26	No	No	No	No	No
Tulsa	..		12,000	62	1	1	...	1	Yes
Wagoner	2		1,800	6	No	No	No	1	No
Oregon									
Astoria	6		8,200	21	No	No	Yes	No	No
McMinnville	5	H. & L.	2,000	None	No	No	No	No	No
Salem	1(1)		45,000	...	1	...	Yes	No	No
Pennsylvania:									
Altoona	..		17,500	88	No	No	1	No	No
Beaver	1		2,000	...	No	...	...	...	...
Bellefonte	3	Hose carriage	1,600	None	No	No	No	No	No
Bristol	2		7,000	14	No	No	No	Yes	No
Brookville	3		1,500	None	No	No	No	No	No
Carlisle	1		3,500	27	No	No	No	No	No
Coatesville	..		2,000	25	No	Yes	Yes	...	No
Doylestown	3	H. & L., chemical	2,000	...	...	...	...	...	...
Easton	2		12,000	57	No	No	1	1	No
E. Stroudsburg	3	H. & L.	2,000	None	No	No	No	No	No
Edgewood	..		900	20	No	No	No	No	No
Edwardsville	1		3,000	None	No	No	No	No	No
Farrell	..		4,000	None	No	No	No	No	No
Franklin	2		4,000	12	Yes	...	Yes	Yes	No
Gallitzin	..		1,000	None	No	No	No	No	No
Honesdale	5	Chemical	6,000	7	...	...	...	...	No
Jermyn	2	H. & L.	2,500	a	No	No	No	No	No
Johnstown	..		14,500	98	Yes	No	Yes	Yes	Yes
Juniata	3		3,000	74	No	No	No	No	Yes
Kane	..		2,200	15	...	...	...	...	...
Lansdowne	(2)		2,000	...	...	...	...	...	...
Latrobe	5		3,000	None	No	No	No	No	No
Mauch Chunk	3		4,500	15	No	No	No	1	No
Meadville	3		8,000	42	Yes	...	1	Yes	No
Monessen	5		2,500	1	...	...	...	...	...
Nanticoke	3		8,000	20	No	No	No	No	No
New Brighton	1		4,650	None	No	No	No	1	No
New Castle	..		9,500	71	Yes	No	Yes	Yes	No
Norristown	..		10,000	35	...	...	...	...	...
North East	2		3,000	a	No	No	2	2	Yes
Oil City	2		6,800	32	2	...	...	...	No
Pottsville	1		8,800	34	No	No	1	1	No
Rankin	2		1,900	17	No	No	...	Yes	No
Reading	..		21,000	97	No	No	No	Yes	No
Ridgway	4		7,000	...	No	No	No	No	No
Sayre	5	Chemical	3,000	None	No	No	...	No	No
Scranton	..		20,500	194	No	No	3	1	No
Sewickley	1		2,200	...	...	...	...	...	...
Shamokin	..		4,000	27	No	...	1	...	...
So. Brownsville	2		1,800	12	No	...	2	No	No
Steelton	2	Ladder	3,500	20	No	No	No	No	No
Sunbury	..		6,000	26	...	...	Yes	...	No
Towanda	5	H. & L.	3,600	2	No	No	No	No	No
Uniontown	2		2,500	30	2	No	1	No	No
Watsontown	..		2,500	...	...	...	...	...	...
West Chester	3	2 eng., chem., 2 combination, H. & L.	2,850	27	No	1	No	2	No
Wilkes-Barre	..		16,000	...	...	...	2	...	...
Rhode Island:									
E. Providence	6	2 hose wagons	7,050	9	No	No	1	Yes	No
Pawtucket	..		14,000	136	No	...	4	No	No
Providence	..		40,000	483	2	...	12	...	Yes
Westerly	..		4,500	27	No	No	No	No	No
Woonsocket	1		12,500	91	No	Yes	2	2	No
South Carolina:									
Aiken	3	H. & L.	2,250	12	...	...	...	...	...
Charleston	..		15,000	124	Yes	...	Yes	Yes	Yes
Chester	1		2,500	...	No	No	No	No	No
Florence	1		3,700	...	...	...	...	2	No
Georgetown	(2)		3,000	12	...	...	...	...	...
Newbury	4	H. & L.	3,000	...	...	...	...	...	...
Orangeburg	(5)		3,000	17	No	No	No	No	No
Rock Hill	3		2,500	25	...	...	...	...	...
Spartanburg	1		5,000	32	No	No	No	No	No
Sumter	..		2,500	12	No	No	No	No	No
South Dakota:									
Aberdeen	..		4,000	...	1	...	1	1	...
Brookings	2	H. & L., chemical	1,100	None	No	No	No	No	No
Mitchell	..		3,000	26	No	No	No	No	No
Pierre	2	2 hose wagons	3,000	None	No	No	No	No	No
Sioux Falls	1		6,000	18	Yes	1	1	1	No
Vermillion	2	H. & L.	1,000	1	No	No	No	No	No
Tennessee:									
Chattanooga	..		16,000	79	No	No	Yes	No	No
Fayetteville	1		2,000	...	...	...	...	...	...
Greenville	4	Hose wagon	1,300	...	No	No	No	No	No
Knoxville	..		12,000	76	No	No	Yes	No	No
Manheim	2	H. & L.	1,400	...	...	...	...	...	Yes
Nashville	..		22,700	158	No	No	Yes	No	No

For foot notes see page 294.

FIRE APPARATUS IN AMERICAN CITIES.

Table No. 3.—Hand Drawn Apparatus and Miscellaneous Data.—Continued.

City	Hand reels	Other hand drawn apparatus	Serviceable hose on hand, ft.	No. of public alarm boxes	Are oxygen helmets	Are pulmotors	Are cellar pipes used?	Are searchlights used?	Training school for firemen?
Texas:									
Beaumont	..	.....	11,000	64	No	No	Yes	2	No
Brownsville	2	.....	2,800	None	No	No	No	No	No
Brownwood	..	.....	3,800	None	No	No	No	No	No
Comanche	(1)	.....	1,600	2	...	...	...	...	...
Corpus Christi	6	.....	4,000	...	...	...	...	...	...
Eagle Pass	2	Hand pump, H. & L.	1,200	None	No	No	No	No	No
El Paso	..	.....	11,500	75	...	...	1	1	...
Fort Worth	..	.....	25,000	150	Yes	...	Yes	...	No
Georgetown	1	H. & L., hose wagon	2,700	...	...	...	...	...	...
Honey Grove	..	.....	2,400	...	No	No	No	No	No
Lufkin	2	.....	1,800	3	No	No	No	No	No
McKinney	..	.....	2,500	None	No	No	No	No	No
Navasota	4	H. & L., 3 hose wagons	1,500	None	No	No	No	No	No
Tyler	..	.....	3,580	...	Yes	...	1	2	...
Utah:									
Ephraim	2	Hand pump	1,200	1	...	...	...	...	...
Ogden	1	Hand pump	6,000	26	No	No	Yes	1	...
Salt Lake City	..	.....	15,000	120	Yes	...	Yes	Yes	Yes
Vermont:									
Bennington	3	.....	3,950	21	No	...	Yes	...	...
Montpelier	2	Hand engine	3,000	49	No	No	1	No	No
Rutland	..	.....	....	38	No	No	1	...	No
St. Albans	..	.....	4,500	29	...	...	3	...	No
Virginia:									
Alexandria	..	.....	4,500	None	No	No	No	No	No
Bedford	2	.....	1,000	1	No	No	No	No	No
Charlottesville	..	.....	3,000	None	No	No	No	No	No
Farmville	5	H. & L.	3,000	12	Yes	...	...	Yes	...
Fredericksburg	2	H. & L.	3 000	None	No	No	No	No	No
Harrisonburg	6	H. & L.	1,500	8	...	...	...	...	...
Lexington	3	H. & L.	1 500	None	No	No	No	No	No
Lynchburg	..	.....	10,000	73	Yes	Yes	Yes	Yes	Yes
Marion	4	Chemical	2,000	None	No	No	No	No	No
Newport News	..	.....	9,000	32	No	No	No	No	No
Portsmouth	..	.....	7,500	37	No	No	No	No	No
Roanoke	..	.....	12,000	75	Yes	...	Yes	...	Yes
Salem	2	.....	3,000	18	No	No	No	No	No
Staunton	1	.....	1,600	31	No	No	No	No	No
Wytheville	..	.....	1,200	...	...	...	...	...	...
Washington:									
Cle Elum	5	H. & L.	3,500	5	No	No	No	No	No
Ellensburg	..	.....	3,800	8	No	No	No	1	No
Everett	..	.....	8,000	47	...	...	2	...	...
Hoquiam	..	.....	6,800	33	No	No	No	No	No
No. Yakima	..	.....	4,000	29	Yes	No	Yes	Yes	No
Olympia	3	H. & L.	5,000	18	No	No	No	Yes	No
Snohomish	3	.....	2,800	None	No	No	No	No	No
Spokane	1	.....	30,000	264	No	No	Yes	Yes	No
Vancouver	2	.....	3,500	...	No	No	Yes	No	No
West Virginia:									
Benwood	..	.....	3,000	40	No	No	No	Yes	No
Bluefield	..	Hose cart	4,500	26	No	No	No	No	No
Keyser	3	.....	1,500	...	...	...	...	...	...
Morgantown	5	.....	4,000	...	...	...	...	...	...
Wisconsin:									
Algoma	3	H. & L., 4 chemicals	1,800	...	No	No	No	No	No
Appleton	..	.....	6,000	45	Yes	...	Yes	No	No
Ashland	..	.....	6,000	32	No	No	2	No	No
Baraboo	..	.....	3,000	4	No	No	No	No	No
Beaver Dam	..	.....	3,000	...	No	No	No	No	No
Berlin	..	.....	3,000	...	...	...	2	...	...
Chippewa Falls	(1)	.....	4,000	23	...	...	...	...	No
Columbus	3	Supply wagon	1,800	2	No	No	No	No	No
De Pere	..	.....	2,000	...	...	...	...	...	...
Eau Claire	..	.....	8,000	42	No	No	Yes	Yes	No
Fond Du Lac	..	5 chemicals	7,100	42	...	...	2	...	...
Hudson	(2)	.....	2,500	7	No	No	No	No	No
Janesville	..	.....	6 000	74	No	No	Yes	No	No
Jefferson	2	H. & L.	1,900	None	No	No	No	No	No
Manitowoc	..	.....	5,200	60	No	No	1	2	No
Marinette	..	.....	4,000	64	No	No	Yes	No	No
Merrill	..	.....	....	...	...	1	2	...	...
Milwaukee	..	.....	75,000	553	Yes	No	Yes	Yes	Yes
Oconomowoc	3	.....	2,500	3	No	No	No	No	No
Oshkosh	..	.....	13,000	72	No	No	Yes	No	No
Plymouth	4	H. & L., chem., steam eng., hose wagon	3,000	None	No	No	No	No	No
Racine	..	.....	12 000	47	...	...	1	...	...
Rhinelander	..	.....	4,300	17	...	...	...	...	Yes
Rice Lake	4	H. & L.	2,900	None	No	No	No	No	No
Stanley	..	H. & L., 3 hose carts	1,600	None	No	No	No	No	No
Stevens Point	..	.....	5,500	25	...	...	...	...	...
Stoughton	..	.....	2,200	..	No	No	Yes	No	No
Superior	3	Chemical	13,500	80	Yes	1	Yes	Yes	No
Two Rivers	..	3 hose carts	3,000	1	...	...	...	...	...
Waupun	1	.....	1,800	...	No	No	No	No	No
Wausaw	..	.....	9,000	36	No	No	1	No	No
Canada:									
Brantford, Ont.	..	.....	7,000	35	1	No	2	2	No
Chatham, Ont.	..	Salvage wagon	4,300	27	Yes	No	Yes	No	No
Kingston, Ont.	..	.....	4,500	36	1	...	Yes	No	No
London, Ont.	..	.....	12,000	76	2	1	2	...	Yes
Peterborough, Ont.	..	.....	5 550	26	No	No	1	...	No
St. Catherines, Ont.	1	.....	3,850	39	...	...	...	...	...
Sault Ste.Marie, Ont.	3	.....	5,000	17	2	...	2	...	...
Stratford, Ont.	..	.....	4,000	38	No	No	No	No	No
Victoria, B. C.	..	.....	21,000	87	2	1	4	1	No
Windsor, Ont.	..	.....	6,000	68	Yes	Yes	Yes	Yes	No

A—Special connection to public telephone. b—Number not given. c—Have frequent fire drills.
Figures in parenthesis indicate apparatus in reserve.

NEWS of the MUNICIPALITIES

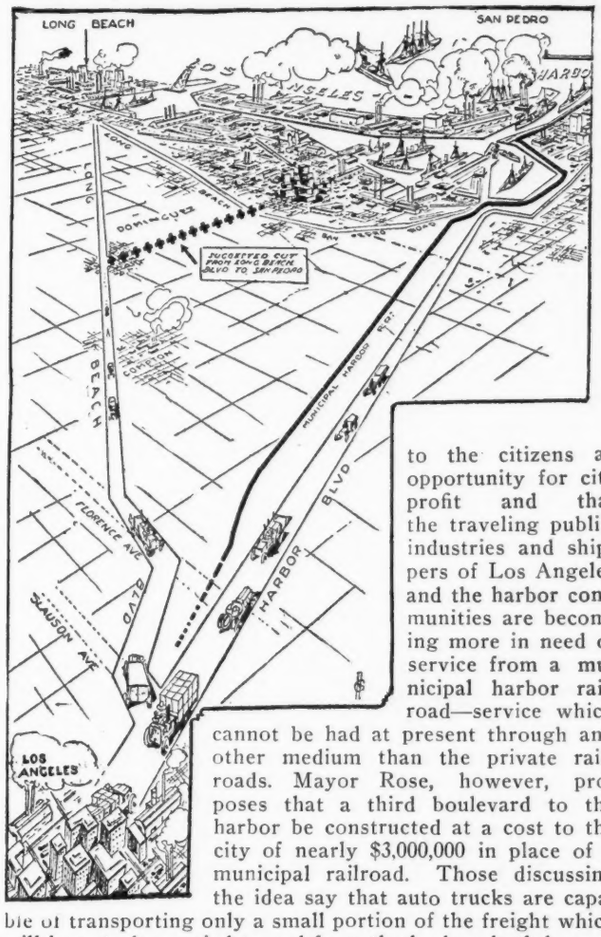
Current Subjects of General Interest Under Consideration

by City Governments and Department Heads

ROADS AND PAVEMENTS

A Fine Harbor Boulevard.

Los Angeles, Cal.—With the completion in the near future of the few remaining links in the harbor boulevard to San Pedro, Los Angeles will be served by two magnificent automobile truck highways leading to this city from different points on the harbor line. This has suggested



to the citizens an opportunity for city profit and that the traveling public, industries and shippers of Los Angeles and the harbor communities are becoming more in need of service from a municipal harbor railroad—service which cannot be had at present through any other medium than the private railroads. Mayor Rose, however, proposes that a third boulevard to the harbor be constructed at a cost to the city of nearly $3,000,000 in place of a municipal railroad. Those discussing the idea say that auto trucks are capable of transporting only a small portion of the freight which will have to be carried to and from the harbor, both by reason of the character of freight shipments and the limitations put on the trucks. A large volume of transportation business, claim the municipal railroad enthusiasts, will fall to the private railroad company and that Los Angeles' only hope of becoming a participant in the profits growing out of railroad shipments to and from the port, on which she has spent millions of dollars and is preparing to spend as many more, is to construct and operate a railroad to the harbor, there to connect with and become a working part of the harbor belt line.

Large Paving Work Poorly Done.

Philadelphia, Pa.—Because the material used to make the fill to bring the Southern boulevard up to grade was not allowed to settle before the surface improvements were added, it will be necessary to do over again much of the work on which the city has already spent $761,000. Highway Bureau Chief Connell says the added expense of refilling on the boulevard, which has sunk two feet; the relaying of concrete and resetting of conduits, manholes and light ports, will prevent the job being completed with the $210,000 now available for the work. Contractor Vare shifts the blame to ex-Mayor Reyburn, who, while in office, ordered the improvements put on the surface before the fill had settled. Chief Connell says that the principal filling material used was household ashes and in consequence there was much settling. Concrete curbs and sidewalks, brick gutters and macadam roadways, electric light poles, inlets, etc., were placed on top of this "fill" immediately after it had been thrown in place and before it has had a chance to settle. The result is that these costly curbs, sidewalks, gutters, etc., are ruined and it will be necessary to throw away a great portion of this expensive surface work. Replying to Chief Connell's criticism, Senator Vare said that the filling of the boulevard was done with clean ashes, earth and gravel, the very best fill to be had, strictly in accordance with the specifications. The settlement of the paving and curbing and the finished street on top of this fill was due to the fact that several hundred thousand yards of filling were placed in one year, without giving it the usual time for settling. Mayor Reyburn ordered the paving and curbing to be done on this green fill, which was about 20 feet deep, in the same year. Under ordinary circumstances the fill would have been allowed to lie from at least six months to a year for settlement before the paving was done. It was not so in this case, as the government officials at the navy yard were threatening to stop improvements unless the city gave them a finished street leading from the navy yard gate up to the city, and the mayor ordered the work done at once to satisfy the government officials, and said he was willing that the city be responsible for settlement under the circumstances, and added that the city would not be a party to stopping improvements at the navy yard.

Road Work to Commute Convicts' Sentences.

Springfield, Ill.—Sentences of prisoners who do good work on state roads will be commuted ten days for each thirty that they work on the highways, Governor Dunne has announced. The honor system will be used; convicts whose terms are under five years will be ineligible, and counties which are the beneficiaries of the plan will be required to pay fifty cents a day to maintain each convict employed. The governor recently inspected road work in Colorado and Washington and said he was impressed by the progress made and the value of employing prison labor in this manner.

The new state highway commission today announced a preliminary estimate of proposed allotments of the state aid fund, from automobile taxes, for good roads. It is estimated that the total amount to accrue from the automobile tax each year will be $400,000. The special state appropriation for the year 1914-15 will total $300,000.

Test Gas Company's Right to Dig Up Streets.

New Brunswick, N. J.—A test case will be made by the city concerning the right of the Public Service Gas Company to open the city streets and lay mains, if any further action is taken by the company to lay a pipe across Livingston avenue, at Welton street. The Common Council has now directed the City Clerk to notify the company that the asphalt torn up must be replaced within forty-eight hours or the work would be done at the company's expense by the city. The police have stopped the work at the direction of the Aldermen.

SEWERAGE AND SANITATION

Trenton's Trunk Sewer Victory.

Trenton, N. J.—Upon the grounds that the attack upon the Passaic Valley sewer outlet into New York Bay is misconceived and that an important public work should not be delayed by an injunction, except the right to be protected is clear and without serious doubt, Acting Chancellor Backes has filed an opinion in the Court of Chancery denying a preliminary injunction restraining the Passaic Valley Sewerage Commissioners from constructing a pressure tunnel eastward of Newark Bay to Robin's Reef, in New York Bay, as the sewer outlet. The suit for the restraint was brought by William Berdan and seven other taxpayers of Paterson. The complainants claimed that the sewerage effluent to be carried into New York Bay by the proposed outlet could be safely deposited in Newark Bay and at a saving of $6,000,000, and hence that the complicated expenditure for the building of the tunnel was an abuse of discretion reposed in the Sewerage Commissioners by the Legislature. The acting chancellor shows that New York Bay, because of its greater depths and dilution volume, constantly agitated by strong tides and currents of greater velocity, is a far better place for the deposit of the effluent from the sewer than the shallow and sluggish waters of Newark Bay. He shows, too, that to install "Imhoff septic tanks" and carry the outlet to the tower waters of Newark Bay, near the Kill von Kull, would not result in any saving, and besides, the septic tanks would involve an outlay equal to, or in excess of the cost of the tunnel. Acting Chancellor Backes decides against the contention of the complainants that the cost of carrying the effluent into New York Bay would be an unwarranted and inexcusable waste of public funds. He says he is inclined to regard the reasons which actuated the opinions of the complainant's sewer experts as hypercritical. He rules that the fact that the Sewerage Commissioners and the municipalities involved adopted a higher factor of safety than is approved by the complainants, is not a ground for equitable interference with the discretion vested in them by the Legislature.

$1,500,000 Sewer Completed.

Rochester, N. Y.—The report of City Engineer Edwin A. Fisher on the sewage disposal system construction has been completed and submitted to Mayor Hiram H. Edgerton. The contracts for the sewer construction call for an expenditure of about $1,500,000. Practically all of the work except the building of the sewage disposal plant in Irondequoit has been finished. Assistant City Engineer John F. Skinner has made a report on the separate sewer system in Brighton. Special Assistant Engineer N. Adelbert Brown has made experiments on sedimentation and scouring velocity. After the new system is in effect George C. Whipple, a consulting engineer, will make another report on the purity of the water.

Liquid Chlorine Instead of Hypo Chlorite.

St. Louis, Mo.—Concurrent with reports of a typhoid fever epidemic on the South Side, Dr. Max C. Starkloff, health commissioner, and Edward E. Wall, water commissioner, has announced that the process of sterilizing the water with liquid chlorine will soon be substituted for the process using hypo-chlorite of lime. Wall assured Dr. Starkloff that typhoid on the South Side was not due to germs in water. If the water carried the germs, Wall argued, the epidemic would have been general. Wall said he was having chemists watch the condition of city water carefully. Two machines will be purchased, one on a ninety-day trial. They will be operated by a representative of the Electro Bleaching Gas Company of New York, which manufactures them. The first machine will cost $3,750, and the second $2,250. They will be guaranteed to sterilize from 100,000,000 to 125,000,000 gallons of water daily. The gas will cost 10 cents a pound, only during the ninety-day trial. A yearly contract for supplying the chlorine will be drawn and submitted to all companies which manufacture it. Both machines will be placed at Chain of Rocks.

WATER SUPPLY

Water Famine in Many Kansas Towns.

The recent drouth in Kansas has wrought terrible havoc with the water supply of many cities dependent on streams. The suffering in deep-well supplied towns has not been as great.

Pittsburg, Kan.—Obtaining its water from wells more than 1,200 feet in depth, Pittsburg is certain about its water supply but the conditions in the surrounding country are becoming alarming. Creeks and ponds have dried up, wells are low and cisterns have been emptied. Farmers in various parts of Crawford county are hauling water from deep wells. In the southwest the Neosho river is furnishing the supply.

Winfield, Kan.—According to Jack Melfelt, superintendent of the municipal plant, this city's water supply would have given out a month ago had it not been for the dam at the Baden mills situated west of the Santa Fe bridge. It has held the water back, preventing it from coming on down stream and running over the gravel bars to the south of the intake pipe. Enough water is let through as needed. To further increase the supply, the bed of the river will be dredged out below the mill to allow the partial draining of two pools there.

Burlington, Kan.—Mayor Groesbeck has warned the people that the city water is absolutely unsafe to drink at this time until after it has been boiled. A recent test shows that practically all of the well water, not only in town, but from wells on farms, is bad. The long continued drouth has spoiled nearly all of the drinking water, and boiling is necessary. Typhoid fever is feared.

Ottawa, Kan.—The water situation in Ottawa has not yet grown to be very alarming. There is still enough water in the two pools in the river to feed the intake pipe for a week and probably longer with careful use of water by the consumers. The water and light department have given out an optimistic report, but stated that patrons of the water plant should be careful and help conserve the water.

Salina, Kan.—This city does not depend on the river for water and, according to Superintendent John H. Bell of the water works company, there is no great danger of famine here. The water is taken from deep wells which form a supply independent of drouth.

Coffeyville, Kan.—Conditions at the waterworks plant are almost normal with every prospect of a steady improvement. A constant flow of water is now being received at the pump station from up river where pools were released by the large force of men and teams put to work by the city. While there will continue to be a shortage of water until the situation is relieved by rains yet it is believed that a sufficient supply exists between here and McTaggart's dam to furnish fire protectioin and water for domestc purposes for several weeks. The work on the river is not to be abandoned until all of the pools have been connected up and a continuous channel dug in the river's bed for a distance of several miles above the pump station. The Mayor of Coffeyville had stated that the McTaggart dam near Independence would be shattered with dynamite it conditions grew worse.

Belleville, Kan.—This city has a plentiful supply of water in contrast to other cities, which depend upon a surface water supply, because Belleville has gone down 180 to 200 feet for its water supply. The original city well supplied about 5,000 gallons of water per day, but that well has been abandoned and three new city wells have been drilled to an average depth of 200 feet each. The capacity of these three wells is estimated to be 200,000 gallons per day, which is easily within the requirements of the city.

Lawrence, Kan.—This city of 15,000 inhabitants is suffering terribly from exhausted water supply and illness from bad water. There is practically no rainfall. Wells from which the water supply is drawn are dry, and water from the Kansas River, now very low, has been turned into the mains. The cisterns are dry.

Hutchinson, Kan.—Although there has been no good rain for weeks and heat has been intense, there has been little suffering here because the water is derived from a sand strata overflow.

City Sued for Damage Done by Filters.

Atlanta, Ga.—This city is made defendant in a suit for $50,000 alleged damages brought in superior court by the Atlanta Steel company. The steel people allege damages resulting from filtering reservoirs owned by the city on the Chattahoochee river above their plant. The mud caused to settle in reservoirs, aver the steel company's attorneys, Payne & Jones, by the chemical filtering process is cleaned out at regular intervals when an extra large amount of water is turned into the reservoirs. Then the water and mud, it is alleged, come down into a large pond owned by the steel company and settle there, having already filled the pond. These conditions, it is alleged, have resulted in the company's losing $20,000 through having to shut down the plant, and $30,000 in damages to the pond and machinery. The steel company has been operating at its present location for eight years, it is alleged, and only within the last year has the mud been coming down into the company's plant. The company states it can prove its prior right to its position.

STREET LIGHTING AND POWER

World's Largest Power Dam for California.

South Yuba, Cal.—In a few months there will be completed here, in a narrow gorge of the south fork of the Yuba River, just below Lake Spaulding, the largest dam in the world. The structure, it is expected, will reach a height sufficient to allow of its being put into operation by the first of next year, the rest being completed later. The project will result in more than doubling the horsepower available in the state, which is already, according to Agricultural Department records for January 1, 1912, 450,000. Lake Spaulding is one of the largest of a chain of storage reservoirs on the Sierra range and has a capacity of about 250,000,000 cubic feet. The new dam which is to be 305 feet high, will have the effect of raising the waters to such height as to give the lake a storage capacity of just sixteen times that amount. Six power plants are also being constructed along the entire length of the valley country between the Sierra Nevada Mountains and the Sacramento Valley. These plants, when installed to their full capacity, are expected to add no less than 160,000 horsepower to the generating and distributing system.

The cost will be covered by an appropriation of $10,000,000. Work was begun immediately upon the approval of the engineers' estimates in July, 1912, and before the winter season stopped operations the foundation of the big dam had been constructed to the extent of lifting a breast-wall to the waters of the South Yuba at a height of 38 feet above bedrock. From the site of this dam the water is to be conveyed by a mile-long tunnel bored through solid rock, which at the other end discharges into Bear River Valley, down which at the distance of nine miles from the lake stands the Drum power house, in a gorge of the Bear River underneath a precipice of 1,375 feet. Down this two pipes will convey the waters from the ditch above to the wheels. Work on this tunnel was carried on through the winter, and on May 1 last the gangs of workmen, laboring from either end, met in the middle, and the tunnel is now fully completed.

The project had its origin in the purchase by the California Gas and Electric Corporation of the properties of the South Yuba Water Company, which owned a number of storage lakes, canals and ditches that were originally constructed for the benefit of the mining industry in the days before the hydraulic monitor was put out of commission by California's state law. This purchase was made in 1905, and only a few months later the company's engineers went over the ground and selected Lake Spaulding as the best available site for a storage reservoir that would be larger by far than anything ever before conceived, let alone executed, in that region. It was not until the Pacific Gas and Electric Company took over the property and franchises of the California Gas and Electric Corporation that the great dam and its collateral work became practicable. The Pacific Company has been serving with gas and electric power an extensive region in California and the new project will vastly enlarge its facilities.

Electric Lighting Department Pays.

Calgary, Alberta.—The electric light department is one of the municipally owned industries of Calgary which returns a large dividend to its owners, the ratepayers and residents generally. According to the report of the city electrician the system cleared $24,913 for the first seven months of the present year. The number of customers using city electric light and power is 11,338. The city of Calgary buys its power en bloc from the Calgary Power Company, which has two large hydro-electric sites on the Bow River, some 50 miles west of this city. The city then retails the power to manufacturers and to domestic consumers. The power company is at present busy developing its second site, which is situated at the Kananaskis Falls. Here twelve thousand horsepower will be generated and officials of the company declare it will all be needed by the time it is turned on early in the coming winter. This power is of course also used to run the Calgary Municipal street railway.

City Buys Power Site.

Spooner, Wis.—To provide cheap light and power for its industries this city has bought forty acres of land nine miles away, on the Namekagen River, for a water power site. Here is one of the best remaining sources of power that are undeveloped in that state, and the purpose of the city officials is to supply the power from the plant at cost to manufacturers that locate in Spooner. According to one estimate, the charge may be as low as one cent per kilowatt. The entire enterprise will be handled as a city affair. Municipal ownership already has a strong hold in Spooner. The local electric light plant is driven by water from the Yellow River, which flows through the city, and is owned by the city. The supply of water for domestic purposes comes from a city-owned artesian well. Last of all the city possesses a small opera house of its own.

Lighting Companies Refuse to Install Electroliers.

Los Angeles, Cal.—As a direct result of the attitude recently assumed by the private lighting companies, proceedings for the extension of the Pico street ornamental lighting system from Vermont avenue to Crenshaw boulevard were formally abandoned by the City Council. Councilman McKenzie informed the Council that similar action probably would be taken in the case of the proposed system on Olive street from Sixth to Pico. The notice recently given by the electric light companies that they would hereafter refuse to install the necessary conduits and cables connecting the electroliers is responsible for this state of affairs. According to the city attorney, these companies cannot be compelled to make such installations, and the alternative is for the property owners to do the work themselves at an estimated additional cost of about $1 a front foot. The remedy for this condition, the Council says, is a municipally owned power and light distributing plant, and the attitude assumed by the private corporations is strengthening the sentiment on the part of the people of this city in favor of such an enterprise.

Cities Oppose Power Company's Bond Issue.

Joplin, Mo.—Mayor Jesse Osborne has called a meeting of the Mayors, city attorneys and Commercial Club representatives of Southwestern Missouri and Southeastern Kansas, which are served by the Empire District Electric Co., and its affiliated corporations. These representatives are called together for the purpose of conferring in regard to the application to the Missouri State Utilities Commission, by the Ozark Water & Power Co., for permission to issue $6,000,000 of bonds. The Henry L. Doherty Co. owns the Ozark Power & Water Co. and controls the Empire District Electric Co. and other companies. It is stated that some 100 cities are included in the call. Mayor W. H. Black and City Attorney G. W. Crowder and O. C. Donahey, president of the Business Men's League, and Harry Marks, secretary, will represent Carthage. The present capital of the Ozark Water & Power Co. is $2,000,000. Since the public will have to keep profits on a basis of the new bond issue as well as the capital, the Mayor considers it important to the public that the capital and bonds represent only what is actually expended in equipment.

Stone and Webster Company in Connecticut.

Falls Village, Conn.—The Connecticut Power Company, one of the new interests of the Stone and Webster Company, has commenced the building of a power plant here to furnish current for Torrington, Thomaston, Bristol and other smaller towns in that part of the state. At the present time the company has the franchises for the generation transmission of electricity in the towns named, but may sell only to other companies for distribution.

Milwaukee Gets Cheaper Gas.

Milwaukee, Wis.—The gas rates of this city have been further reduced by the Wisconsin Railroad Commission. The primary rate has not be reduced, but the quantity of gas which can be used under this rate has been reduced by almost one-third.

City Refuses to Sell Light Plant.

Athens, Ala.—The city has refused to sell its light plant to the Alabama Power Company. The vote was largely against the sale and this ends the fight for a year. The city is busy now installing a new light plant and when it is ready for operation day current will be turned on and the old plant will be overhauled and kept as a supply when needed. The fight to sell was most vigorous and much feeling was engendered, but the advocates of selling were never in sight of a sale.

Lighting Rates Reduced.

Patchogue, N. Y.—Following charges filed with the Public Service Commission protesting against the high rates of the Patchogue Electric Light Company, the company has voluntarily reduced the rates. The agitation commenced several months ago but the company took no action. A. Rufus Applegarth, the leader in the consumers' fight, says that the complaints lodged at Albany will be withdrawn. The new rates, which are as low as those of any other company on Long Island, will go into effect on September 1 and are as follows:

For first 25 K. W. H. per month	15 cents
For second 25 K. W. H. per month	14 cents
For third 25 K. W. H. per month	13 cents
For fourth 25 K. W. H. per month	12 cents
For fifth 25 K. W. H. per month	11 cents
All over 125 K. W. H. per month	10 cents

FIRE AND POLICE

Fireboat Nozzle Kills Fireman.

New York City, N. Y.—At a $200,000 oil yard fire, Bertram Johnson, of the fireboat Abram S. Hewitt, was struck by the nozzle of the "bow gun" ripped loose by water pressure, and instantly killed. The Hewitt was one of the boats helping the fourteen land companies who were fighting the blaze from the shore, and was hurrying closer to the flames to save the immense quantities of oil stored nearby. Suddenly the "bow gun" was ripped out by the 130 pounds pressure and the nozzle and base, weighing almost half a ton, were shot into the air. Johnson was struck on the head, and killed. Covering him with tarpaulin, his comrades pushed further into the flames.

Huge Fire in Jersey City—Engine Burned.

Jersey City, N. J.—This city is now coping with the wreckage and destitution caused by a fire which started on August 20 and which, by the time the flames were out out, devastated an area of ten square blocks, rendered homeless and propertyless 45 families comprising nearly 200 people, injured 13 persons and did damage estimated variously at between $400,000 to $750,000. Practically none of the fire victims carried insurance because of the high rates in the neighborhood of the fire which was known as the conflagration district. After two alarms a general alarm was sounded and every piece of apparatus in the city was at the scene of the fire, while two engines were brought from Bayonne to cover the hill section and some apparatus from Hoboken to meet alarms in the downtown section. In the absence of Chief Conway, Acting Chief Lovell was in command, while the reserves from all precincts were in requisition and doing admirable work under Chief Monahan. A northeast wind was blowing and in rapid succession several factories and tenements were reduced to ashes. The firemen were hampered in their work by poor water pressure and when the fire was at its height many of the firemen were working with a stream probably not over ten or twelve feet.

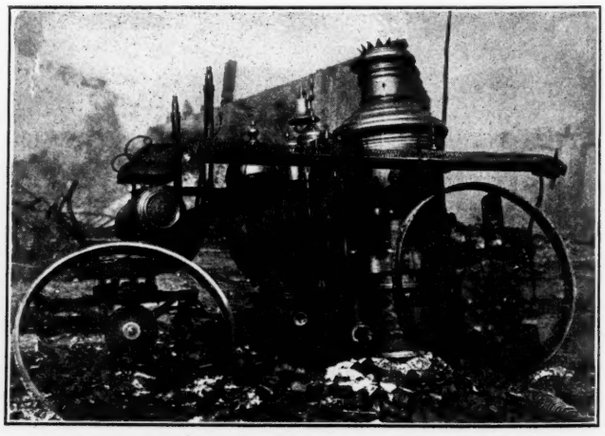
When the blaze was at its height the heat was so intense that it was an impossibility to get within a block of the scene. Engine No. 10 was stationed on Fairmount avenue directly in front of the Heidt cooperage where the fire had begun. When the wind veered from the northeast to east a solid wall of flame shot into the street, and the driver and fireman in charge of the engine had to flee for their lives. The wind held steadily in that direction long enough to ignite the structures on the east side of the avenue. When the wind veered back it was seen that the engine had been wrecked by the flames. It was at first reported that the engine, which is valued at $5,000, had been totally destroyed. When the flames had abated to an extent that admitted of the wrecked engine being inspected it was ascertained that the boiler and tender were still intact. It will be repaired at the city's shop at a cost of $1,000. A peculiarity of the partial destruction of the engine was the fact that in spite of the terrific heat to which the machine had been exposed, the gauges and the clock on the engine were unharmed. Late in the afternoon the clock was ticking as regularly as when the engine arrived on the scene. Besides the wrecked engine the fire department sustained the loss of several thousand feet of hose which were burnt or otherwise spoiled.

In order to afford greatly needed protection, the Board of Commissioners have authorized former Fire Captain John Sweeney to put in service at once the demonstrating engine provided by the Dixon Pump Company. The company is giving the engine to the city on assurances that it will be given the contract for a new engine in spring on the delivery of which it bid low last June.

Among the injured were Captain Coleman and Firemen Lyman Quackenbush, Clements, Howard Van Voorhis, William Decker, Fred Walsh and Gravedunkel.

Courtesy, Newark News.

GENERAL VIEW OF THE JERSEY CITY FIRE.



Courtesy, Newark News.

THE WRECKED ENGINE.

Fire Imprisons Workmen in Aqueduct Shaft.

New York City, N. Y.—While sixty-two laborers were at work in shaft 9 of the Catskill Aqueduct, 450 feet below street level, fire broke out in the building at the shaft-head. Four men were injured as a result. The fire stopped the ventilating motor which supplied fresh air to the foot of the shaft and the men were held more than five hours in the dark, airless depths before they were rescued. Fire Chief Kenlon, in one of the most dangerous and spectacular rescues in the history of the department, led the firemen down long ladders while burning debris rained down about them. The perilous descent took forty minutes and the pent men were found huddled back 1,000 feet from the shaft and able only to stand the lack of air for a very little while longer. They were hoisted in a bucket rigged to a derrick. The fire was transmitted to the fronts of seven apartment houses but the blaze was held under control.

Campaign for Factory Fire Protection.

Trenton, N. J.—The State Labor Department, under the direction of State Commissioner Lewis T. Bryant, urged on by the memory of the Binghampton disaster, is making determined effort to abolish fire perils in factories.

Bright red cards are posted in the plants and the people are being educated to intelligent fire-fighting co-operation by means of moving-picture shows depicting factory fire drills, proper methods of escape, factory fire brigades at work and other fire scenes. Commissioner Bryant has studied extensively, both here and in Europe, the various standardized alarm systems for factories and New Jersey was the first state to consider the perfection of fire alarm equipment in its application to industrial plants. Chance of failure in the apparatus is practically eliminated and the cost of maintaining reduced to a minimum.

These standardized fire alarms are now installed in more than 600 factories in the state, and from ten to twelve plans for new ones are submitted daily. The alarms are installed under general specifications prepared by the State Department. The State Department has an electrical engineer who assists in the installation of the fire alarm systems when desired. Each system consists of an electro-mechanical gong, or a vibrating bell or horn, as may be approved by the department; with one or more specially designed fire alarm boxes on each floor of the building. One of the series of red cards referred to is posted in connection with each alarm box. To aid further in the fire protection, Commissioner Bryant recently issued a booklet on "Rules and Regulations for Conducting Fire Drills, and Organizing Fire Brigades." It gives complete and practical information for forming and maintaining an effective factory fire fighting force. The erection and maintenance of proper fire escapes is another part of the crusade. Not only does General Bryant enforce the law with reference to the proper type fire escapes, but the window frames leading to the escapes must be fireproofed, and the panes must be wire glass. As to the practical results of the crusade, it has been shown that with these fire alarms and proper fire drills, from 1,800 to 2,000 factory operatives may be removed from a factory in from one and a quarter to one and a half minutes. Other factors in the safeguarding of human lives in factories are regulations for the proper location and proper number of egresses; the fireproofing of interior stairways and the requirement that plans for new factories or additions to present ones, must be submitted to the State Department.

Establishing a Fire Force.

Queens, N. Y.—In response to insistent demands of big real estate interests here, Fire Commissioner Johnson has sent a force of attaches of his department to the Newtown section of Queens to begin preparation for the establishment there of a paid department of the city. The men from the city department will go on duty on Sept. 1. Nine companies will be installed replacing thirteen companies of volunteer firemen who have been serving for many years. Most of them will be equipped with automobile apparatus. The city firemen will be in Ridgewood, Evergreen, Maspeth, Elmhurst, Corona and Winfield. About 200 men will be required to man these companies. The volunteers have been protecting property valued at more than one hundred million dollars. This property includes valuable industrial plants along Newtown Creek and the Long Island City border and in the Maspeth and Laurel Hill districts. The paid firemen will also have charge of the thickly populated Ridgewood and Corona sections. Fire Chief Lally is arranging a schedule whereby the newly installed firemen will be assisted by fire companies located on the border of the Newtown ward, in Lond Island City, and Brooklyn.

Fire School "Commencement."

Philadelphia, Pa.—Sixty members of the first class to graduate from the Training School for Fire Service have received their diplomas. Director Porter handed the men their certificates after a brief speech in which he transmitted congratulations from Mayor Blankenburg. The director assured the men that their positions would not be affected by the coming political campaign. He said, comparing the merits of Philadelphia's fire school with those of other cities, that this city's had surpassed that of the metropolis; that the curriculum was the best that could be planned; and that in their two months' study, the graduates had gained knowledge which old firemen had spent years in the service to obtain.

Test Safety Fire Helmet.

Atlantic City, N. J.—Locked in a room filled with fumes of burning sulphur, Chief Black, Assistant Director of Public Safety Glenn, Captain Daniel Johnson, and his entire force have made an exhaustive test of a new smoke helmet manufactured by the Sewns Rescue Equipment Co. The test lasted half an hour and at the end Chief Black was exceedingly pleased with the outcome. The helmet is operated by a system of air regeneration and is constructed of calfskin over reinforced steel frame, the other metal parts being of nickel brass, and the entire weight, 12 pounds, rests on the shoulders, leaving the head absolutely free.

Total Abstinence for Jacksonville Police.

Jacksonville, Fla.—According to an old regulation which has been resurrected, Police Chief Frederick C. Roach has ordered that all policemen under him must be total abstainers. No more intoxicating liquors will be allowed, either on or off duty. The order has received criticism both from men concerned and disinterested citizens but the chief insists that any violation of the rule will be penalized very severely.

Live Wire Kills Fire Chief.

Connersville, Ind.—Walter Barnes, fire chief, was instantly killed on August 19, while fighting a fire in a warehouse. He came in contact with a live wire. Barnes was forty years old and leaves a widow.

A New Gamewell System Installation.

Richmond, Cal.—Work will be begun immediately on the new fire alarm system which will be of the Gamewell type, according to Roy LeMain of the Gamewell Company. The warehouses are in process of construction and the arrival of the material is expected at any time now.

Give Up Relief Drivers.

Porterville, Cal.—By unanimous vote the council has decided to dispense with relief drivers at the Central fire station. For the past four weeks a relief crew has been provided to allow for occasional days off for the regular men who man the auto fire apparatus. The members of the fire department resent the action of the council.

New Pump for Roselle.

Roselle, N. J.—By action of the city council the fire department's equipment is to be improved with a piston pump motor engine at a cost of $9,000.

MOTOR VEHICLES

American-La France Engine Stands Test.

Naugatuck, Conn.—An American-LaFrance auto fire-fighting engine, which is to be used by the Stamford fire department, was demonstrated here in the presence of local officials, a big crowd of interested citizens and a number of out-of-town people including Fire Chief Parks, Engineer Louis Plumb and Capt. Smith, all of the Stamford fire department, and Chief Snagg of the fire department of Waterbury. The machine made a good showing and Fire Chief Clark tonight said the test was satisfactory. In the first test the engine pumped 313 gallons per minute, through 1,000 feet of hose with a one and one-quarter inch nozzle. Without the engine being operated the water came from the nozzle at the rate of forty-five gallons per minute. Through two lines of hose, each 500 feet long, with a one and one-eighth and one and one-quarter nozzle, 640 gallons per minute were pumped. The engine was then driven to the pond known as the "new dam," where the test showed about 887 gallons per minute thrown from three lines of 100 feet each, one and one-eighth inch nozzles being used. The board of warden and burgesses has the matter of the purchase of up-to-date fire-fighting apparatus under consideration and will select a machine at some future meeting.

City Machine Shop Proposed.

Superior, Wis.—A municipal machine and repair shop at which all repairs required by equipment owned by the city could be made has been suggested to the city commission by Fire Chief Johnson and is now under consideration. The present shops in the fire department have become inadequate and the need for shop facilities by the police, street and other departments suggests a city repair shop. Plans and estimates are now being made for a reinforced concrete structure fitted to make ordinary repairs, construct fire and other apparatus and the force, members of the fire department, would consist of a blacksmith, machinist, carpenters and painters.

Fire Apparatus Inspected.

San Antonio, Tex.—Members of the city council finance committee, Mayor C. A. Jahn, Fire Chief Adolph Henne and City Fire Marshal Ed Moeller of New Braunfels inspected the local motor-driven fire apparatus. New Braunfels has appropriated $9,000 for the purchase of a modern motor-driven fire machine according to Chief Henne, and the purpose of the delegation to San Antonio was to become familiarized with the various pieces of apparatus and discover the most satisfactory.

Cadillac Police Car Makes 74,000 Miles in Two Years.

Houston, Tex.—74,000 miles in two years is the record made by the Cadillac five-passenger touring car which has been operated by the police department for the regular work of hurry calls, transporting officers and prisoners to and from the courts, and the like. The car was purchased in 1911 and has just been replaced by a 1913 Cadillac. The car was subjected to very heavy loads and was run over the worst streets in the city, but it is still in good condition.

GOVERNMENT AND FINANCE

City Raises Laborers' Pay.

Des Moines, Ia.—The city council has increased the salary of the laborers employed by the city from $2.25 to $2.50 per day. The new wage scale goes into effect April 1, 1914. It will be taken care of in the present appropriations. Mayor Hanna opposed the resolution bitterly, offering an amendment to fix the wage scale at 25 cents above the usual wage paid for laborers of the city's class. The council voted him down. Mayor Hanna then explained his position. He said the city should pay the best wages at all times. He said he opposed this increase because the council does not know what labor conditions will be next spring.

Chamber of Commerce Disapproves City Bonds.

San Francisco, Cal.—Stamping the proposal to issue $3,500,000 more municipal bonds for municipal railways with its unqualified disapproval, the Chamber of Commerce has issued a statement declaring itself against the bonds. It was held by those in favor of the municipal enterprise that new railway facilities would be needed during the coming exposition. The Chamber of Commerce contends that the exposition can be served in other ways not involving a large drain on municipal resources. The chamber thinks that the extension of the existing system of privately owned, franchise-holding street car lines could not be accomplished under the municipal ownership plan. It says, however, that extensions could be obtained with extending franchises. It further insists that the city is indebted to a tremendous extent, $80,423,000, owing to the many large municipal activities at present in progress, such as the Hetch-Hetchy water supply, civic center, schools, and streets. Any further bond issue, it considers, therefore, would be unwarranted extravagance.

Manager Government Successful.

Fredericksburg, Va.—The first year of this city's new form of government under the commissioner plan has been completed here, and the results are most gratifying. The city commissioner is R. Stuart Royer, who commenced his duties August 15, 1912, and during the year he has made extensive improvements, especially to the streets of the city, and has administered all of the affairs of his office with exceptional ability.

Highest School Levy in Topeka.

Topeka, Kan.—The highest school levy in the history of the city, seven mills, has just been fixed by the Board of Education. The increase is deemed necessary in order that a start be made towards paying off the indebtedness of the board since each year the payment is required of enough interest to erect a new school building. If all money is collected, the levy will bring in $374,500. In the general fund, the levy was fixed at five mills; one mill was allowed for building fund; the interest fund was increased from .45 mills to half a mill and the sinking fund from .05 to a half mill. This last increase was provided to take care of the board's bonded indebtedness of $520,000. The general fund levy will be $267,487 and the expenditure of this fund is estimated as follows:

	Estimate 1913-14.	Paid in 1912-13.
Teachers' salaries	$204,670.00	$195,301.89
Janitors' salaries	16,000.00	15,622.60
Superintendent, clerks, engineer, treas'r	8,500.00	7,099.65
Printing	700.00	529.50
Supplies—Janitors	1,700.00	1,117.48
Supplies—School	2,200.00	2,146.82
Supplies—Office	275.00	272.03
Supplies—Water	600.00	542.30
Supplies—Manual Training	3,200.00	3,176.69
Supplies—Manual Training equipment.	150.00	136.34
Labor	2,600.00	2,546.08
Incidental repairs	1,000.00	902.14
Apparatus and chemicals	500.00	474.43
Fuel, light, and power	13,000.00	12,810.65
Books	300.00	782.09
Insurance	1,200.00	684.71
Furniture	400.00	569.98
Taxes	1,500.00	1,374.85
Incidental expenses	7,000.00	7,200.00
Retirement fund	2,600.00	2,540.91
Total	$268,095.00	$255,132.41
Warrants outstanding, July 1, 1913	62,220.94	
	$330,315.94	

Tax City-Owned Telephones.

Barnesville, Minn.—Because a municipally-owned telephone company cannot be classed as public property used exclusively for public purposes, the city must pay a gross earnings tax to the state, according to the opinion of Asst. Attorney General Stevenson. Since 1903 Barnesville has refused to pay the tax, claiming that the enterprise was public in its nature. More than $1,700 in taxes has accrued from that time. In his opinion, Mr. Stevenson says that city water works and electric light plants can be classed as public property used for public purposes, but that telephone exchanges are of a different nature and not essentially "public" in character.

STREET CLEANING AND REFUSE DISPOSAL

Incinerator for Racine.

Racine, Wis.—After ten years of effort Racine is to have a garbage plant in the incinerator which has just been completed and is ready for official tests. It is probable then that a sidetrack will be extended to the plant so that coal can be purchased by the car load. The three garbage wagons recently purchased from the Holzbog Company of Jeffersonville, Ind., will be on hand soon and the work of collection will be started immediately. The wagons to be used are one horse vehicles of full steel construction. They were purchased for $160 each which was a saving of $130 per wagon over the price asked by other companies. When the new fire pumps arrive enough horses will be taken from the fire department to supply all the garbage wagons but until that time it is planned to hire horses.

RAPID TRANSIT

Seattle Enjoined on Street-Car Rates.

Seattle, Wash.—An order enjoining the city of Seattle from enforcing an ordinance requiring street car companies to place on sale in every street car tickets at twenty-five for $1 or six for 25 cents, has been filed by United States District Judge Rudkin of the Eastern district of Washington. The injunction was granted on complaint of the Seattle Electric Company. The suit has been pending since November, 1911. Judge Rudkin holds that the State Public Service Commission law superseded the power of municipalities to enact ordinances affecting public service corporations. "If the plaintiff in the case obeys the ordinance in question it violates the law of the State because the charges made are less than those by fixed schedules on file, and if it obeys the law of the State it violates the city ordinances. Such a conflict of authority is not to be tolerated," said Judge Rudkin in his opinion.

Street Car Line Given to City.

Seattle, Wash.—The utilities committee of the council has decided to accept the offer of the owners of the Highland Park and Lake Burien street car line to give the eight-mile stretch of electric railway to the city free of cost on condition that the latter would keep it in operation. The little railway, which extends from the south end of the bay through a sparsely settled district to the southwestern part of the city, was built at a cost of $124,000, and never did enough business to pay the operating expenses. The only stipulation made by the committee in recommending to the council that the offer be accepted was that the present owners pay off $35,000 outstanding indebtedness and file a bond of $24,000 to guarantee payment should any more old debts turn up. These stipulations were tentatively agreed to.

Franchise Clause Demands City's Right to Purchase.

Des Moines, Ia.—In two provisions of Mayor James R. Hanna's tentative city railway franchise, accepted by the members of the city council, the city demands the unqualified and unimpeded right to purchase the street railway and that the company must pay all operating expenses and taxes. The franchise will extend for twenty-five years. On the purchase of the system the council agreed that the franchise shall specify the city's right to purchase at the end of the following years at the following prices:

Twenty-fifth year, full physical valuation; twenty-fourth year, physical value, plus 1 per cent; twenty-third year, physical value plus 2 per cent.; twenty-second year, physical value plus 3 per cent.; twenty-first year, physical value plus 4 per cent.; twentieth year, physical value plus 5 per cent.

From the nineteenth year on down to ten years an increase of 1 per cent. will be added for each year. For the first and second years after the franchise is granted the city will pay the capital value of $4,055,000, agreed upon some time ago by the council, less 1 per cent. One per cent. will be taken off the capital value for each year up until the tenth year of ownership.

The council acquiesced that the railway company shall agree by the terms of the franchise to enter no opposition to a bill introduced in the legislature to give the city the power of purchase. This is slightly different from the mayor's plan. Mayor Hanna wanted the railway company to join the city in petitioning for a law in 1914.

MISCELLANEOUS

City to Erect a Model Suburb.

Cleveland, O.—A model suburb or village, to be owned by the city, is favored by Mayor Newton D. Baker, who stated that he would ask that such a community be established. The city owns 93 acres of land along East boulevard. The mayor's plan is to have the city divide this tract into building lots and erect model cottages which would be leased to tenants.

Municipal Band Concerts for San Antonio.

San Antonio, Tex.—The City Council has authorized the Finance Committee to enter in the annual budget for 1913-14 a suitable appropriation for municipal band concerts. These concerts will be inaugurated on September 1, this year, and will run through the winter tourist season until June 1, 1914. The resolution for the appropriation was introduced in the council on the recommendation of the Chamber of Commerce and the Rotary Club. The City Council has also officially accepted for the city the Santa Fe Park and the three other small parks about three of the ward school buildings. These parks were given to the city to be forever used for park purposes. The land given is valued at $21,383. This leaves a balance of $40,000, the amount given by the Santa Fe Railroad officials. Of this, $10,000 will be set aside for a permanent fund and the balance used to put the parks in condition. Ordinances were passed relative to the parks, their care and their operation. Three Park Commissioners were appointed. These are W. C. Blanks, T. C. Wynn and C. A. Broome. They receive no compensation for their work.

Open Playgrounds at Night.

Buffalo, N. Y.—All the playgrounds in the city will now be lighted. According to Superintendent Harry Allison the attendance at all those already lit is very heavy, about 1,000 persons using the Lincoln playground every evening, the others being equally popular. The lighting of the Lanigan playground is nearly finished and the park almost completed, and a neighborhood celebration will mark the opening. The lighting of the grounds has solved the problem of recreation for the working boys and girls who are given the right-of-way in basket ball courts and on all apparatus. The older residents, too, are beginning to find attractions on the playgrounds. On account of their treeless condition, the playgrounds are too hot to use during midsummer days, and the lighting of the grounds makes it possible for the children to transfer their play period to evening.

Slot Machines Barred.

Hartford City, Ind.—Each person here known to be operating a slot machine of any kind has been called to the office of Prosecutor L. F. Sprague and informed that henceforth the machines are barred. The prosecutor will not confine himself to this city and Montpelier, but will make a clean-up in Wells County as well. The recent grand jury returned several indictments against local cigar store proprietors and others for operating gambling devices. Several fines were enforced, but the practice has continued. If the present edict is not obeyed Judge Eichhorn will probably add a jail sentence to fines, according to the prosecutor. Whether the prosecutor will abolish card-playing in the cigar stores is a matter of conjecture.

Semaphore for Directing Street Traffic.

Philadelphia, Pa.—This city is first among the cities of the world to use the semaphore for regulating street traffic. A device known as the Porter-Ray traffic semaphore is now in operation at the intersection of Broad and Chestnut streets, where traffic is as heavy as at any cross corners in the world, according to Philadelphia officials. It is similar to those used on railroads except that it is operated by the "crossing policeman" by hand. It can be seen by drivers or chauffeurs a block away. It was ordered installed by Director of Public Safety Porter. Captain Martin H. Ray, "systematizer to the director," invented the apparatus. Director Porter said that he will install the semaphores on all downtown street crossings if the one at Broad and Chestnut streets proves a success.

MOTOR FIRE APPARATUS

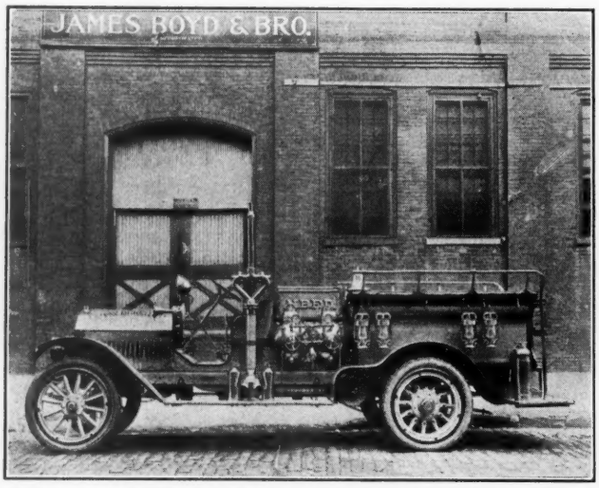
Some Leading Types of the Three Main Classes of Motor Fire Apparatus —Combination Chemical and Hose Trucks—Pumping Engines and Ladder Trucks.

In the course of five years the status of motor fire apparatus has changed from experiment to that of acknowledged success. Nevertheless the changes in means of propulsion do not seem as revolutionary as it was predicted they would be. The general types of apparatus are substantially the same as they were before; namely: chiefs' wagons, chemical engines, combination chemical and hose wagons, hose wagons, pumping engines, ladder trucks, water towers and general service wagons. The period of experiment and development seems to have passed and that of standardization succeeded it. In matters of detail of different manufactures there is much variety both in the means of propulsion and in the fire fighting equipment. One original type of apparatus has, it is true, been developed as a consequence of the installation of a gasoline power plant on the fire apparatus—that is, the mechanically driven pump, generally of the rotary type. In this article disregarding for the sake of simplicity differences even of considerable importance, apparatus is divided into three classes: Combination chemicals, pumping engines and ladder trucks.

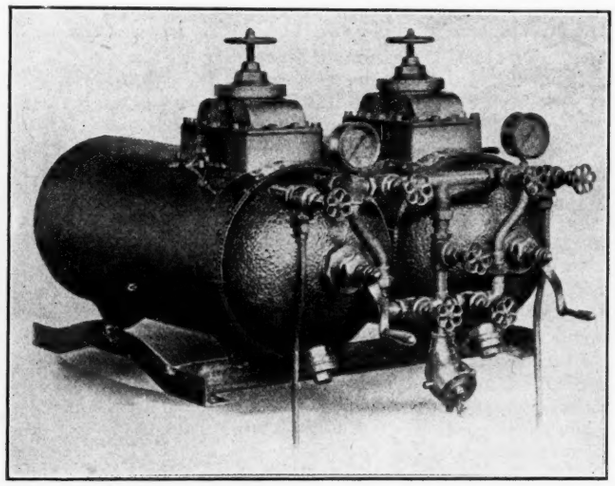
COMBINATION WAGONS.

Combination chemical and hose wagons and the modified types such as squad wagons that have been developed from them are in a certain sense the strongest automobile proposition in the whole field. That is to say the high speed automobile is at its best in this type. For this reason there are many manufacturers of automobiles who have made this type of apparatus and no other. Speed is an essential characteristic of the machine because they must cover a wide territory, reach the fire first and get back promptly to the house prepared to answer another alarm. The chemical equipment carried by different cars varies much in style and capacity; the amount of water hose carried is generally 1,000 feet or more and the seating capacity for men also varies. The wagon bodies are generally simple in style and chemical tanks of various kind can be purchased so many manufacturers have made vehicles of this type. One manufacturer of automobile apparatus, James Boyd & Bro., Philadelphia, Pa., stand ready to furnish their regular body and chemical apparatus to any manufacturers of chasses who may desire it. They have furnished such equipment for White, Mack, Alco, Locomobile, Premier Autocar and other chasses.

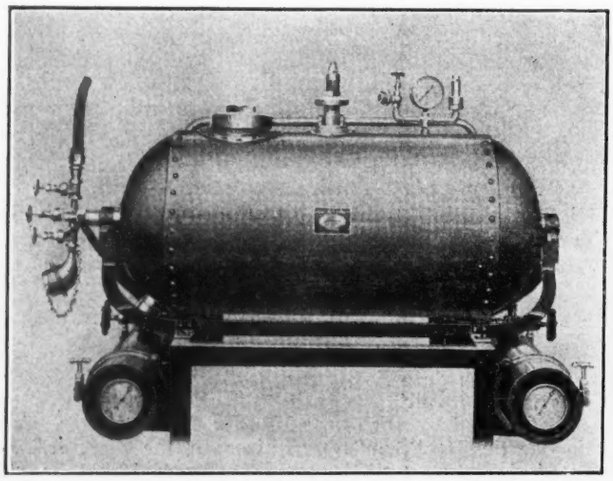
The illustration shows a Boyd Model C combination chemical and hose truck recently delivered to New Brighton, Pa. It carries double 35-gallon Holloway tanks, a steel hose body squad type with curved sides and side seats. The body carries 1,000 feet of 2½-inch fire hose. It also carries a Hart turret nozzle. The double Holloway equipment, complete with by-pass, gages and fire hose connection is illustrated. The 35-gallon size measures 16 by 44 inches and may be either polished copper or nickel plated. These tanks and connections are tested to 350 pounds per square inch water pressure and 150 pounds gas. The soda equipment is the old standard chemical apparatus. Within the last year or two the Boyd company



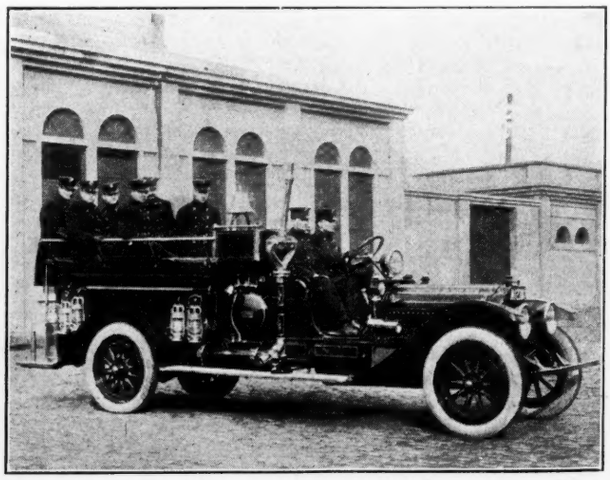
BOYD CHEMICAL WITH SODA TANKS.



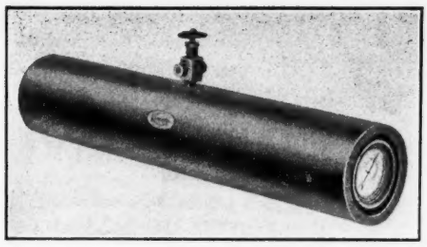
DOUBLE HOLLOWAY SODA TANKS.



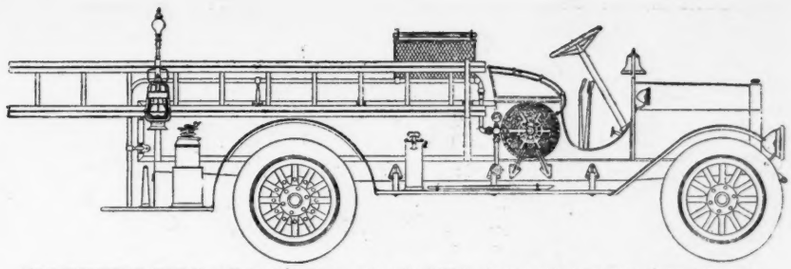
CHEMICAL TANK OF KANAWHA SYSTEM.



WHITE COMBINATION CHEMICAL.



COMPRESSED AIR TANK, KANAWHA SYSTEM.

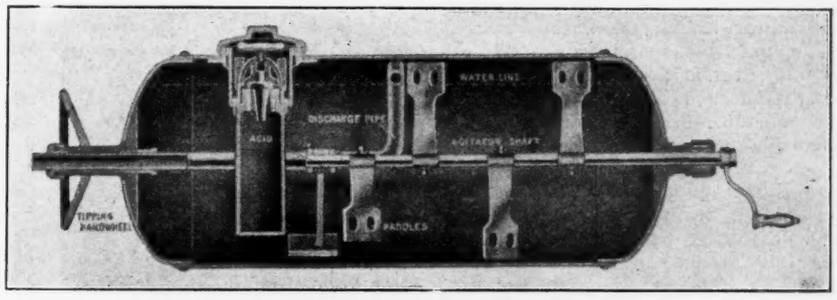


NORTHERN FIRE APPARATUS COMPANY'S COMBINATION CHEMICAL.

has equipped cars with the Kanawha air pressure equipment. Illustrations show the chemical tank and its equipment and the smaller air tank. This tank carries a supply of air at a pressure of 1,000 pounds per square inch. When in use at a fire the compressed air is let into the chemical tank through suitable valves and the chemical is thrown on the fire in a steady powerful stream. It is stated that the Kanawha system is a real advance and improvement in chemical fire apparatus. It will, it is said, extinguish larger fires than can be handled by soda and acid machines. The stream can be thrown to a greater height. Any solution may be used in the Kanawha, the ordinary ones being soda or carbon tetrachloride, which extinguishes electrical and oil fires.

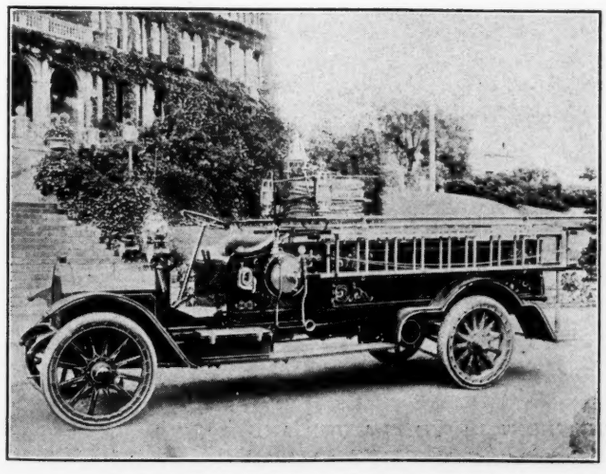
The La France Company, Elmira, N. Y., make several styles of combination wagons. The motive power of all La France apparatus is of the same general style, but four cylinders are used on some machines and six on others. The cylinders have 5½-inch bore and 6-inch stroke. In designing all their apparatus the La France company have been aided by their long experience in fire apparatus construction. Questions of strength, power and balance have always been kept in mind in drawing the designs. Great strength, ample power, a very low center of gravity and a complete elimination of rear overhang, reduction of weight, a broad gage or tread, a very short turning radius and tires that will hold the ground are the requirements necessary for the safety of men and car which have been borne in mind.

La France chemical tanks are of the Champion or the improved Champion-Babcock type, the latter being illustrated. The distinctive feature of the Champion tank is the method of operation. An acid receptacle provided with a loose stopper is so placed that when the tank is in its normal position the stopper is above the alkaline fluid and the receptacle may be readily reached and removed by unscrewing the cap located above it. The chemical action is secured by revolving the tank. The loose stopper drops into a receiver and the acid gradually flows into the tank forming a gas at sufficient pressure to discharge the water impregnated with the gas through a pipe at the bottom of the tank. The Champion-Babcock tank is mounted on hollow trunnions located at the opposite ends. The revolution of the tank discharges the acid into the cylinder through one of the hollow trunnions. An agitator shaft is provided to mix the chemical.

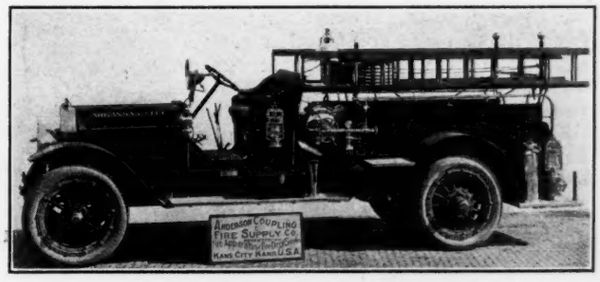


CHAMPION-BABCOCK SODA TANK.

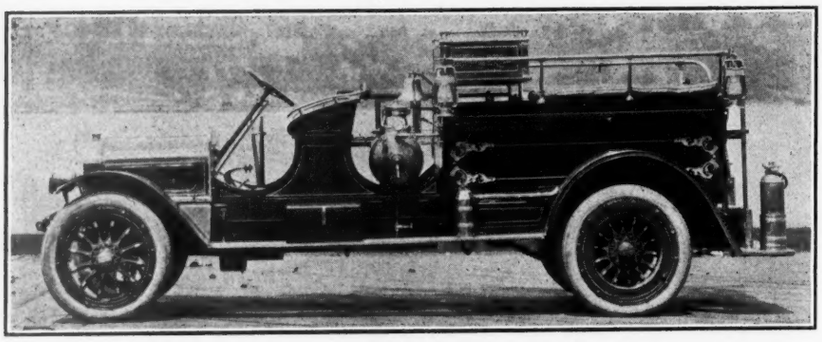
The White Company, Cleveland, O., make motor combination vehicles, one of which recently shipped to Dover, N. J., is shown in the illustration. It has a six-cylinder sixty horse-power engine with an electric starter and employs the Kanawha air system for chemical pressure. Twelve hundred feet of 2½-inch hose are carried in a steel hose bed which is quickly accessible from the rear running board. This bed occupies the conventional position between two seats running lengthwise of the truck. The seats, capable of seating eight men, have good cushions. Under the seats are lockers. Portable chemicals are strapped to the running board and the large nozzles for the 2½-in. hose are carried on posts that are built on the rear running board. Hooks, lanterns, axes, etc., are carried on spring-catches and hooks along the side of the body, a 50-gallon chemical tank is mounted in the customary place in a recession between the driver's seat and the hose-bed, while the chemical hose, 250 feet long, is coiled in a steel basket immediately above the chemical tank. For this class of apparatus where seconds count in getting under way, the White electrical starting system is particularly valuable. It has the unusual advantages of preventing the motor from stalling at all times and without any attention on the part of the driver. Both the functions of starting and lighting are performed by one mechanism, the motor generator, which is mounted at the forward left side of the engine and driven by silent chain. The entire control is centered in a



FEDERAL COMBINATION CHEMICAL.



ANDERSON COMBINATION CHEMICAL.



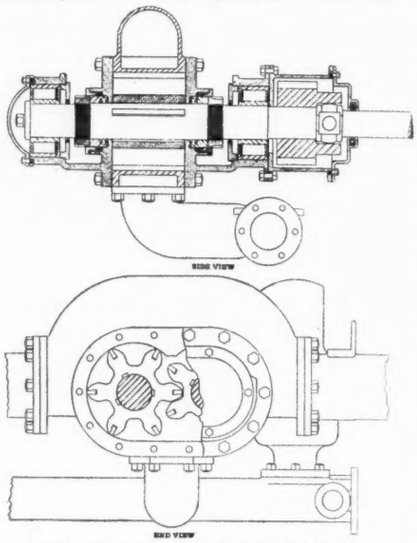
MACK COMBINATION CHEMICAL ENGINE AND HOSE WAGON.

single knife-blade switch located on the dash. When the driver has closed this switch the electric system assumes its duties and performs every function without any further attention and without the assistance of any automatic regulating devices. Both the control of the generator capacity and the change of its functions from that of a generator to a motor are accomplished entirely by the design of the unit itself. Closing the switch connects the nine-cell battery and puts the motor in operation, thus starting the engine. As soon as the latter is turning over at a speed in excess of a few hundred revolutions per minute, the generator being a slow-speed type, the voltage of the motor-generator exceeds that of the battery, and the battery is charged at all speeds above this point, at a definite governed rate. The 18-volt storage battery is "floated" on the line in such a manner that the motor changes to a generator and back again to a motor, according as the electrical pressure rises or falls above or below that of the battery. At engine speeds above a certain definite point it is a generator and below that point it becomes a motor, so that should the engine stall in traffic the electric motor will automatically "pick it up" and restart it without any attention on the part of the driver.

The Northern Fire Apparatus Company, Minneapolis, Minn., make a motor propelled combination hose wagon and chemical engine shown in the outline drawing. It has a four-cylinder motor, 4½-inch bore, 5¼-inch stroke. The drive is by shaft. The car is regularly equipped with pneumatic tires. The body has capacity for 1,000 feet of 2½-inch hose. The Gray & Davis electric lighting and starting system is regularly installed. The chemical tank is Champion or Northern Holloway.

The Federal Motor Truck Company, Detroit, Mich., make combination motor cars one of which shown in the illustration was sold to the fire department of Attleboro, Mass. The chassis is of a commercial rather than passenger design. The motor is 4-cylinder, 4⅛ bore by 5¼ stroke. Drive is by chain. Solid tires are regularly used.

The Anderson Coupling and Fire Supply Co., Kansas City, Kan., recently furnished a combination motor apparatus to the fire department of Arkansas City, Kan., of which an illustration is presented. The following is a brief description of the principal features:



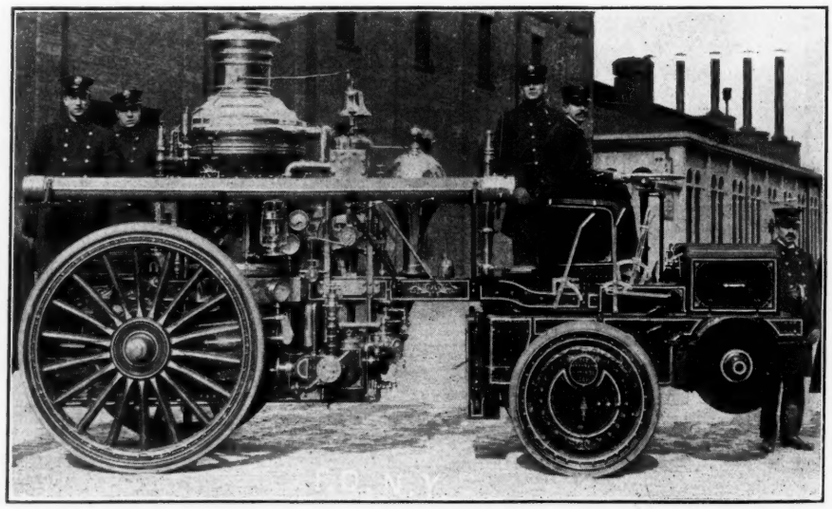
WATEROUS ROTARY PUMP.

Motor, 6-cylinder, 75 horsepower. Speed—40 to 60 miles per hour. Transmission—Four speeds. Timken roller bearing axles and differential system. Locking device on differential. Electric starting and generating system. Extra large braking surface. Double pressed steel frame. Body construction, heavy sheet steel, 1,000 to 1,500 ft. hose capacity. Full equipment of ladders, chemical engine, 40 to 50-gallon capacity. Chemical engine entirely separated from other equipment.

The International Motor Company make the combination hose and chemical automobile so familiar on the streets of New York City. These machines are built on Mack two-ton chasses equipped with steel body, with hose reel capacity of 1,000 feet of 2½-inch fire hose. The body is constructed of either standard hose body type construction or with flared sides and seats for the accommodation of the firemen. The chemical tank has a capacity of 30 to 40 gallons, and is equipped with Lally quick-opening and self-packing tops. The chemical hose basket is arranged to carry 200 feet of special 4-ply hose. Hand rails are provided running from rear of driver's seat to back step. The fire extinguisher equipment consists of two to three gallon break bottle type mounted in polished brass holders on the rear step. Two heavy duck soda bags are provided. The lighting is by two 8-inch headlights, mounted on front spring, together with two side oil lamps on each side of the driver's seat. The electric headlight is provided with current from 60-hour ampere storage battery. The conventional locomotive bell is mounted on the back of the driver's seat or on dash, as may be preferred. The usual complement of firemen's axes, acid receptacle holders, etc., are provided together with tool boxes, one 12-foot ladder and one 20-foot extension ladder. The complete chemical hose wagon is mounted on pneumatic or solid rubber tires.

PUMPING ENGINES.

Pumping engines are of two classes reciprocating and revolving. Recipro-



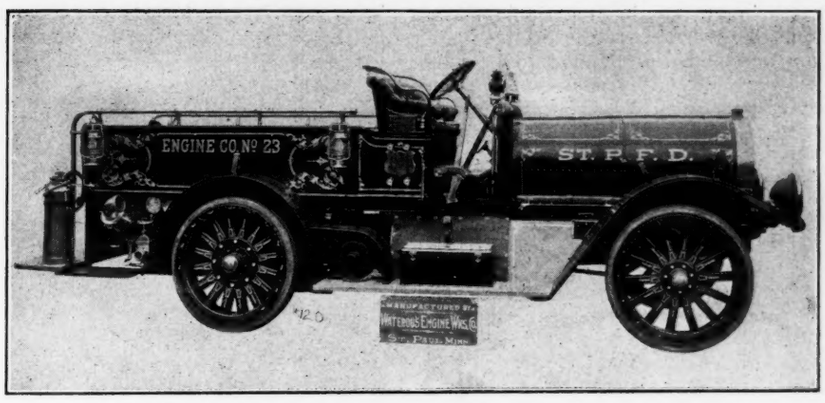
CHRISTIE FRONT DRIVE TRACTOR AND ENGINE.

cating pumps are positive in their action; the water is forced out of the pump by the direct action of the piston. Revolving pumps are of different kinds but in none is the action so direct and positive as in the case of a piston pump. The result is that when acting against great pressure the revolving pumps are less efficient than reciprocating pumps.

Motor propelled pumping fire engines may use steam power or a gasoline engine to operate the pump. If steam power is used there is little or no reason for using any but the reciprocating pumping engine, as that is the standard type of pump that has stood the test of time. Steam fire engines have in times past used revolving pumps and possibly may again, but we are dealing with actual conditions. Motor propelled fire engines using the gasoline engine to drive the pump may use reciprocating or revolving pumps. Loss of power in driving mechanism of the reciprocating pump and loss of efficiency at high pressures are the problems that have to be considered by the designers.

When motor pumping engines first began to attract public attention, many writers in the public press and others jumped to the conclusion that the steam fire engine had outlived its usefulness. This, however, seems to be far from the fact. The gasoline propelled steam fire engine is still a strong proposition.

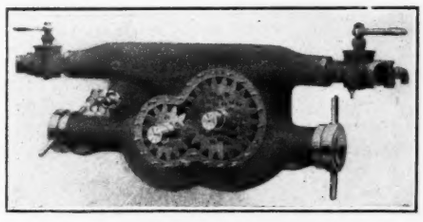
Among the motor arrangements for driving steam fire engines the Front Drive Tractor made by the Front Drive Motor Company, Hoboken, N. J., is chosen for illustration. The compactness of the design is notable but the engine should be seen in actual service to be appreciated. A number of these engines are in daily service in New York City. They move about easily and rapidly and under perfect control, creating actually less disturbance to street traffic than the old horse drawn engines. As the name suggests



WATEROUS ROTARY PUMPING ENGINE AND HOSE TRUCK.

and is apparent from the illustration, the driving and steering are both accomplished through the tractor wheels.

The motor is 4-cylinder, 4-cycle, 5½ inches diameter by 7 inches stroke, maximum speed 1,500 revolutions. The crank shaft is 2¾ inches diameter at bearings which are 3¼ inches long, ball bearings on transmission end. Clutch is of disk type. Transmission



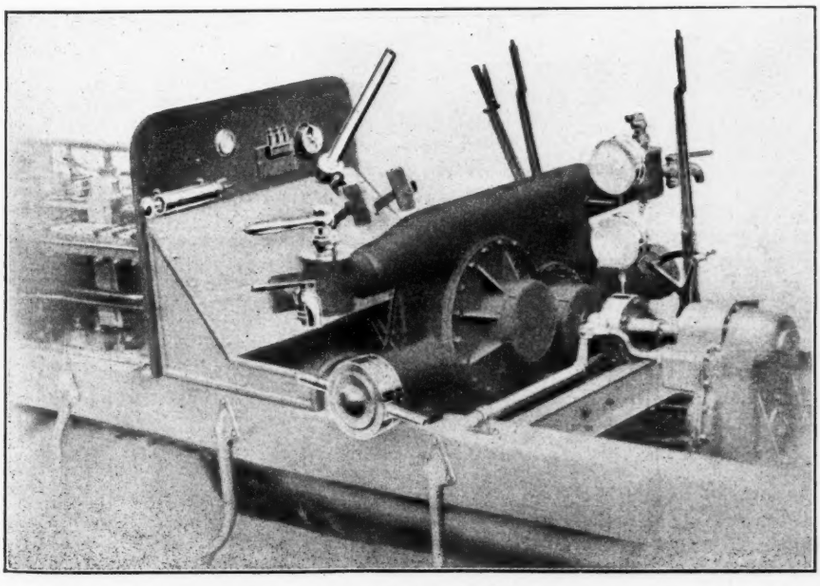
LA FRANCE GEAR PUMP.

is progressive, two speeds forward and reverse, the high speed being driven direct. This speed is used for nearly all duty from 8 to 30 miles per hour. The steering or pivoting is in the center of the driving wheel, the theoretical points of swivel being exactly over the center points of road contact. The main axle is 2½ inches by 4 inches made of 30 carbon steel. The traction wheels are of steel construction with internal driving gears 22 inches pitch diameter, rigidly attached to the steel casing, mounted on ball bearings. The tractor wheels are equipped with solid tires. In applying the tractor to a steam fire engine the old wheelbase is retained. Owing to the construction, and the distribution of weight it is almost impossible for the machine to skid. Owing to the application of power direct to the center of each wheel the machine retains its maximum efficiency in turning a corner or pulling out of holes.

The motor engine using a rotary pump is perhaps the most original design of engine that has been developed in connection with motor traction. We illustrate two of these pumps the gear pump used by the American La France Company and the rotary displacement pump used by the Watrous Engine Works Co., St. Paul, Minn. A glance at the illustrations will make clear the extreme simplicity of these pumps.

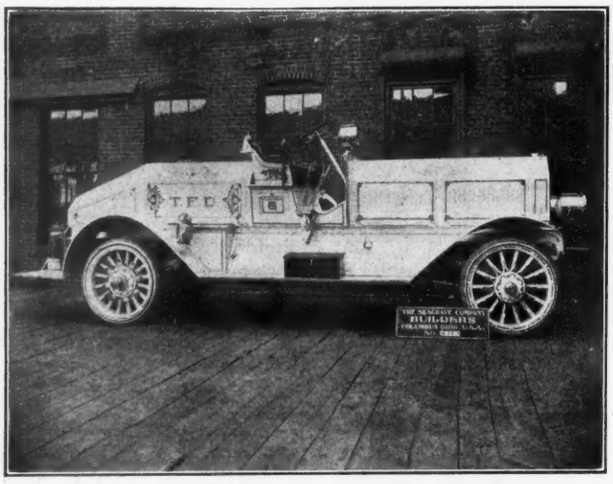
In the La France engine the pump is located under the driver's seat and is directly supported by the main frames and by cross members. The casing is bronze with large water passages. A churn valve or by-pass is cast integral with the pump. The impellers are also of hard bronze. No outside gears are used to drive the gears. The impeller shafts have ball-bearings. There is a universal joint between pump and driving gear, to provide for distortion in going over rough roads. The pump is driven from the main transmission shaft, a sliding gear being operated by a lever. The manufacturer states that the ratio of pump revolutions to engine is proportioned not with a view to maximum delivery under arbitrary selected conditions, but rather with the purpose of affording a satisfactory delivery of water through the wide range of pressures and pump speeds inseparable from fire service.

In the Waterous engine the rotary pump is located at the rear of the machine. The cams have five toes in each of which is a hard rubber gib to make contact close at all times. The shaft bearings are antifriction roller type and run in grease. There are three splines or keys made integral with the shafts and are equally spaced, the ob-



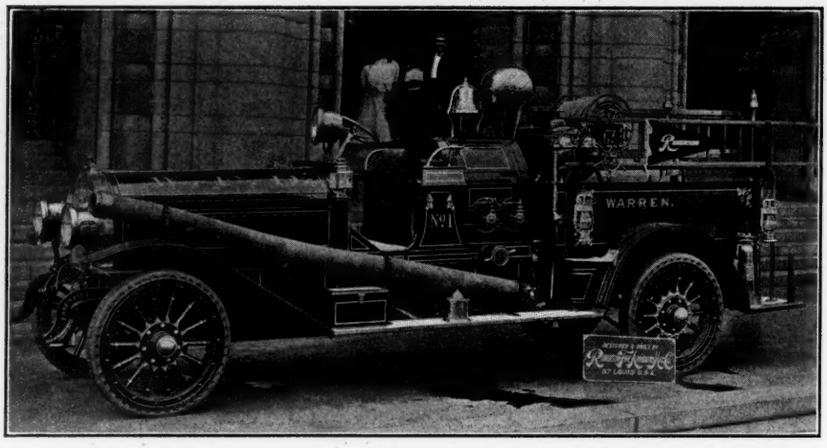
LA FRANCE GEAR PUMP—SHOWING SETTING.

ject being to eliminate periodic vibration. The drive system between engine and pump is claimed to be particularly efficient. Ordinary fire service is performed by using the direct speed, that is, the engine and pump running the same speed, making a direct or straight line drive, there being no gears of any sort in mesh. Where, however, unusually high pressures are necessary, the speed ratio between the engine and pump may be varied by means of gear shift lever, so that any pressure from zero to 300 pounds or more can be obtained at the will of the operator. This device is particularly advantageous and requires no extra gears or shifting mechanism. The transmission gears are made very heavy and carried in steel case and thus made to serve two functions, either that of road work or pumping when occasion requires.



SEAGRAVE TURBINE PUMPING ENGINE.

The Seagrave Company, Columbus, O., make an engine with a pump of the revolving type, quite different, however, from the rotary pumps described above. It is a multi-stage centrifugal turbine. The water as it comes from the hydrant or cistern enters the intake pipe and then passes into the center of the first stage or impeller around the impeller shaft. This impeller impresses on the water a certain pressure and with this pressure it follows the guides or diffusion vanes which deliver it to the center of the second stage or impeller, which adds more pressure and so on through all stages of the pump. The pressure given the water by each impeller depends on the speed at which the pump shaft is rotating.



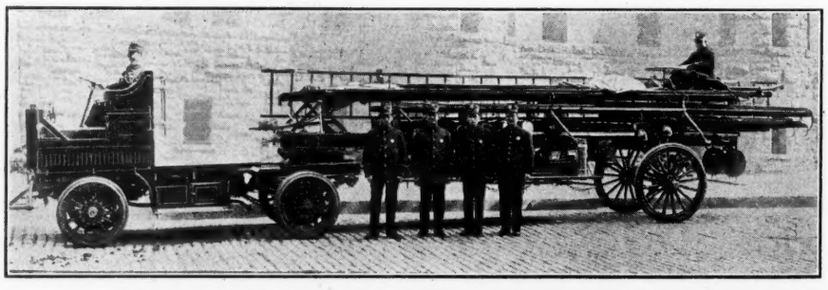
ROBINSON PISTON PUMPING ENGINE, HOSE AND CHEMICAL TRUCK.

The Robinson Fire Apparatus Co., St. Louis, Mo., make an engine carrying a triplex piston pump. In this pump both valve decks are horizontal, insuring perfect operation it is stated even it the springs are removed. The cylinder discharge chamber, compression boxes, valve decks and all parts subjected to high internal pressure are of bronze. The suction chamber and fittings are of bronze and the hanger arms, A frames, etc., of crucible steel. The cylinders are 5¾ inches in diameter, 8 inches stroke, removable, seamless drawn bronze lined. The pump pistons are of solid phosphor bronze. They can be adjusted from outside without dismounting the pump. The pump valves have a large discharge area, equal to that of the piston. There are 24 suction and 18 discharge valves. The illustration of this engine is a triple combination apparatus, that is it carries a chemical tank in addition.

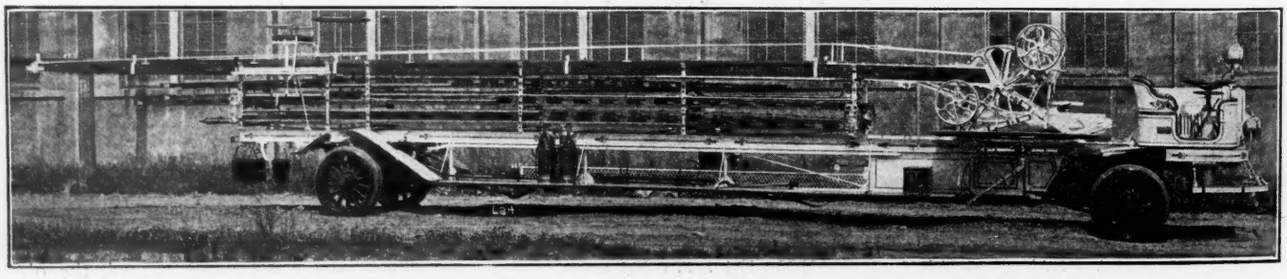
LADDER TRUCKS.

The American La France Co., Inc., Elmira, N. Y., make a gasoline electric four-wheel drive and steer 85-foot hook and ladder truck. The illustration is that of one of their latest machines made for the city of Portland, Ore. The speed of this machine is 30 miles an hour. The wheelbase, 383 inches. Wheels, artillery type. Tires, solid dual, front and rear.

Peter Pirsch & Company, Kenosha, Wis., make a hook and ladder truck which also carries fire hose and chemical equipment. The total length of ladders carried is 250 feet. The chemical tank is the 40 gallon size. One thousand feet of 2½-inch fire hose are also carried. The motor is capable of developing 75 horsepower. The maximum speed of apparatus when loaded with equipment and men is 35 miles per hour. The machine has electric generating and lighting system.



ALCO TRACTOR WITH OLD LADDER TRUCK.



LA FRANCE GASOLINE-ELECTRIC FOUR-WHEEL DRIVE AND STEER AERIAL TRUCK.

NEWS OF THE SOCIETIES

Calendar of Meetings.

LEAGUE OF CALIFORNIA MUNICIPALITIES. Annual Convention, Venice, Cal. Mayor Frank Mott, president, Oakland, Cal.

August 25-30.
FOURTH INTERNATIONAL CONGRESS ON SCHOOL HYGIENE, Buffalo, N. Y. Dr. Thomas A. Storry, Secretary General, College of the City of New York.

August 26-28.
CENTRAL STATES WATER WORKS ASSOCIATION—Seventeenth Annual Meeting, Cedar Point, O.—R. P. Bricker, Secretary, Shelby, O.

September 1-6.
INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Forty-first Annual Convention, Grand Central Palace, New York City. James McFall, Secretary, Roanoke, Va.

September 9-13.
AMERICAN PUBLIC HEALTH ASSOCIATION.—Annual Convention, Colorado Springs, Col.—S. M. Gunn, secretary, 755 Boylston street, Boston, Mass.

International Association of Municipal Electricians.

The eighteenth annual convention was held in Watertown, N. Y., Aug. 19-22, about 400 members and guests being present. President John W. Kelly, Jr., Camden, N. Y., called the meeting to order. Mayor Francis M. Hugo made an address of welcome. Former President J. B. Yeakle, Baltimore, made the response. President Kelly made an annual address reviewing the work of the association. On the second day following a paper by Chief Clayton W. Pike on "Allowable Voltages in Overhead Construction in Cities." Dr. Charles Steinmetz, of the General Electric Company, Schenectady, N. Y., joined in the discussion. Dr. Steinmetz said that every piece of mechanism that any human being has to touch should be grounded. Dr. D. M. Gardner, Boston, Mass., formerly president of the National Electric Light Association, gave a demonstration of resuscitating persons overcome by electric shocks. Following a paper on the "Operation of Fire Alarm Systems in the Smaller Towns," by A. C. Farrand, of Atlantic City, the discussion developed the unanimous opinion that the use of the telephone for transmitting alarms should be discouraged, on account of the errors made in giving the house number and also on account of the delay in securing the connection.

The last day's session was given over to the report of the exhibits committee, designation of committees, the adoption of resolutions thanking the municipality and local organizations for the privileges accorded the delegates, and parting remarks from the associate members. President Kelly, C. E. Diehl, of Harrisburg, Pa., and Electrician Shinnen, of Atlantic City, were appointed a committee to attend the Fire Preventive Congress at Philadelphia in October. T. C. O'Hearn, of Cambridge, Mass.; W. J. Canada, of Washington, and Electrician Firman, of Philadelphia, were named as a committee on grounding, and Mr. Taylor, of Dallas, Tex.; Mr. Joslyn, of Seattle, and Mr. Canada, of Washington, a committee on electrolysis. Both committees will report at the convention in Cincinnati in 1914. The new executive committee, elected late Thursday, is made up of Charles S. Downes, of Altoona; Claude Converse, of San Antonio; William Arbuckle, of Bayonne, N. J.; C. W. Pike, of Philadelphia; Tyler Green, of Toledo; George W. Tully, of Oswego; P. H. Corbett, of Troy; L. S. Bosley, of Springfield, Mass., and Thomas M. Martin, of Cincinnati.

President Kelley made a suggestion to establish a bureau or committee to gather data and information upon lighting rates now in force, together with plans and estimates for the establishment of municipal electrical plants.

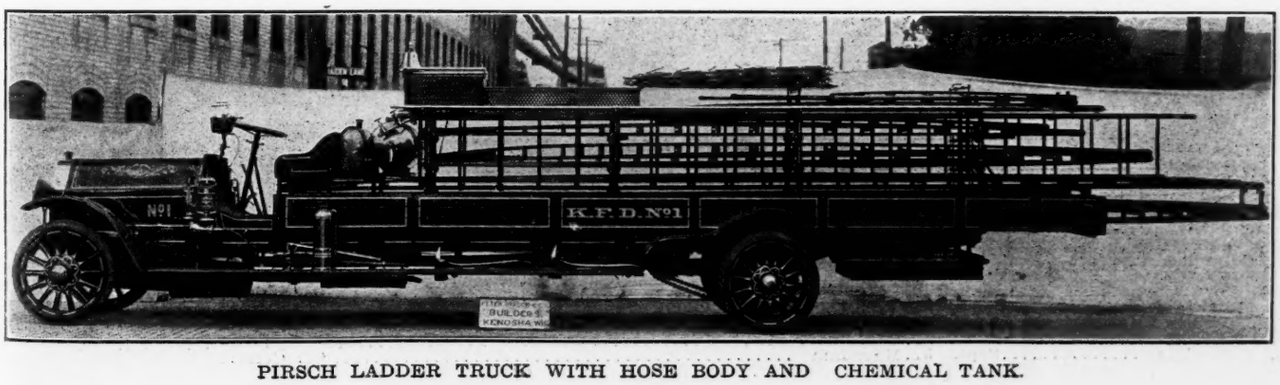
The convention hall was surrounded by an interesting display of electrical appliances from the principal manufacturing concerns of the country. The exhibitors include the Gamewell Fire Alarm Co., of New Jersey; Leeds & Northrup Co., with a display of cable testing devices from Philadelphia; H. W. Johns-Manville Co., New York; the National Electric Specialty Co., of Toledo, O.; the Safety Insulated Wire & Cable Co., of New York; W. N. Matthews & Bros., of St. Louis, Mo.; the Central Electric Co., of Chicago, and D. & W. Fuse Co., of Providence, R. I. The Lucas detachable ladder hook, invented by Howard Lucas, of the Panama Canal Zone Department, formerly of No. 1 Truck Company, Watertown, was added to the list of exhibits Wednesday, being shown by Herbert Tompkins, partner with Mr. Lucas in the invention.

INDUSTRIAL NEWS

Cast Iron Pipe.—Chicago. Market is quiet with very little new inquiry. There have been no changes in prices. Quotations: 4-inch, $28; 6 to 12-inch, $26; 16-inch and up, $25. Birmingham. Continued shipments have reduced the accumulated stocks considerably, and there is a better feeling in the market. Quotations: 4-inch, $20; 6-inch, $22. San Francisco. A few outside towns are taking figures on small quantities, but the tonnage is comparatively light. New York. Private buying is more active and a large letting in Boston is pending. Quotations: 6-inch, car load, $23 to $24.

Lead.—The demand is good. The miners strike in Missouri has had a serious effect on the trade. Quotations: New York, 4.75; St. Louis, 4.675.

Rubber Tire Demonstration.—The B. F. Goodrich Company are to make a practical and thorough demonstration of their wireless tires for motor fire apparatus during the time of the Fire Engineer's convention in New York, Sept. 1 to 6. The Goodrich Company have a most completely equipped branch in the metropolis, and it is here that they will conduct their demonstration. Arrangements will be made to carry all delegates and visitors who wish to take in the demonstration to and from their hotels or the convention hall to the place of the demonstration. It is expected by those who have the interest of Goodrich wireless tires at heart that even a better showing will be made at the coming convention than at the Denver convention a year ago. The increasing use of Goodrich wireless tires on motor fire apparatus throughout the United States is attributed by the Goodrich representatives to the fact that their tires have been specially designed to meet the peculiar and exacting needs of motor fire truck service. They claim that the vulcanizing of the soft rubber tread inseparably to the steel base eliminates the danger of "throwing a tire" while rounding corners at high speed and that the shape of the tire and the specially resilient compound of which the tread is made afford peculiar freedom from vibration, because shocks and jars from unevenness of the road are absorbed within the tire itself.



PIRSCH LADDER TRUCK WITH HOSE BODY AND CHEMICAL TANK.

WEEKLY CONTRACT NEWS

ADVANCED INFORMATION
BIDS ASKED FOR

CONTRACTS AWARDED
ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
			STREETS AND ROADS	
O.,	Mansfield	noon, Aug. 30	Improving Spring Mill Road	F. A. Miller, Clk.
Ind.,	Rushville	2 p.m., Aug. 30	Stone and gravel road	J. E. Harrison, Ch. Comr.
Me.,	Ft. McKinley	11 a.m., Sept. 1	Resurfacing roads	Capt. C. O. Zollars.
Ind.,	Salem	1.30 p.m., Sept. 1	Road; cost, $15,000	F. S. Munkelt, Co. Aud.
Mo.,	Lexington	8 p.m., Sept. 1	Brick pavement	L. Wright, City Clk.
Mo.,	Kirksville	5 p.m., Sept. 1	Concrete sidewalk	A. D. Risdon, City Clk.
N. Y.,	Fulton	8 p.m., Sept. 1	Relaying cement walk, 3,700 sq. ft	John Frawley, Pres.
Ind.,	Tipton	10.30 a.m., Sept. 1	Bituminous macadam	J. H. Transberger, Aud.
Ind.,	Greensburg	1 p.m., Sept. 1	Macadam	L. W. Sands, Aud.
Ind.,	Rensselaer	3 p.m., Sept. 1	Gravel road	J. T. Hammond, Aud.
Miss.,	Macomb	2 p.m., Sept. 1	Improving 60 miles roads	W. T. Denman, Secy.
Ariz.,	Phoenix	Sept. 1	Bitulithic, 21,500 yds.; asphaltic concrete, 12,000 yds	F. M. Holmquist, C. E.
Fla.,	Miami	7.30 p.m., Sept. 1	Sheet or block asphalt, wood bitulithic or brick	Mayor.
Miss.,	Magnolia	Sept. 1	Gravel roads, 60 miles	X. A. Cramer, Engr.
Miss.,	Philadelphia	Sept. 1	Roads, 18 miles	E. T. Myers, Engr.
Ind.,	Vernon	11 a.m., Sept. 1	Highway in Lovett Twp	G. J. Bernhart, Co. Aud.
Ind.,	Greenfield	10 a.m., Sept. 1	Road in Blue River Twp	L. Wood, Co. Aud.
Ind.,	Newport	10 a.m., Sept. 1	Three roads	Roy Slater, Co. Audr.
Mo.,	Rockport	4 p.m., Sept. 1	Grading, 2,000 cu. yds	J. A. Krusor, Hwy. Engr.
Me.,	Ft. Williams	11 a.m., Sept. 1	Resurfacing roads	C. O. Zollars, Capt.
N. D.,	Mohall	2 p.m., Sept. 2	Grading, repairing, etc	P. Carlson, Co. Aud.
Wis.,	Janesville	2 p.m., Sept. 2	Improving streets	J. A. Fathers, Ch.
Ind.,	Winamac	noon, Sept. 2	Gravel, etc	W. F. Munchenburg, Co. A
Ind.,	Logansport	10 a.m., Sept. 2	Paving	J. U. Wallace, Co. Aud.
Ind.,	Washington	2 p.m., Sept. 2	Gravel road	L. S. Core, Co. Aud.
Ind.,	Munson	1.30 p.m., Sept. 2	Paving; cost, $4,100	A. M. Taff, Co. Aud.
Ind.,	Wabash	1.30 p.m., Sept. 2	Gravel roads	D. Showalter, Co. Aud.
N. J.,	Westfield	Sept. 2	Macadamizing, 7,500 sq. yds	C. Clark, Twn. Clk.
N. J.,	Trenton	2.30 p.m., Sept. 2	Water bound macadam, 7 miles	T. Tobish, Co. Engr.
N. Y.,	Glens Falls	Sept. 2	Sheet asphalt on Glen street	City Council.
N. J.,	Elizabeth	8.30 p.m., Sept. 2	Vitrified brick, etc	W. P. Neafsey, Comr.
N. J.,	Jersey City	2.30 p.m., Sept. 2	Improving roads with macadam	H. G. Hough, Dir.
Cal.,	San Jose	11 a.m., Sept. 2	Macadam	H. A. Pfister, Clk.
Ohio,	Swanton	noon, Sept. 2	Paving Main St	W. B. Elwell, Vil. Clk.
La.,	Washington	Sept. 2	Concrete sidewalks and curbs	F. P. Martin, Mayor.
Miss.,	Laurel	Sept. 2	Sheet asphalt, 35,000 sq. yds., and wood, 10,000	H. W. Bell, City Engr.
Wis.,	Janesville	2 p.m., Sept. 2	Vitrified brick, asphalt, macadam, etc	J. A. Father, Ch.
Utah,	Salt Lake City	10 a.m., Sept. 2	Paving and improving several streets	N. Warrum, City Recorder.
Cal.,	Fresno	2 p.m., Sept. 2	County road, 4.41 miles	B. M. Barnwell, Clk.
Miss.,	Vicksburg	noon, Sept. 2	Working road	J. B. Laughlin, Co. Clk.
N. J.,	Summit	8 p.m., Sept. 2	Granite block, 4,420 sq. yds	A. Blair, City Engr.
Ky.,	Louisville	10.30 a.m., Sept. 2	Improving roads	J. R. Gaines, Co. Engr.
O.,	Elyra	1 p.m., Sept. 2	Slag macadam, 4,800 lin. ft	T. L. Gibson, Co. Surveyor.
O.,	Youngstown	1.30 p.m., Sept. 2	Improving road	Co. Comrs.
Ind.,	Noblesville	10 a.m., Sept. 2	Gravel roads, 4	Geo. Griffin, Aud.
Ind.,	Vincennes	2 p.m., Sept. 2	Gravel road	J. T. Scott, Aud.
Ind.,	Bedford	1 p.m., Sept. 2	Macadamized road	E. W. Edwards, Aud.
Ind.,	Delhi	noon, Sept. 2	Gravel road	M. G. Hahn, Aud.
Ind.,	Wabash	1.30 p.m., Sept. 2	Gravel roads	D. Showalter, Aud.
Ind.,	Albany	10 a.m., Sept. 2	Road	J. T. Miller, Aud.
Ind.,	Spencer	2 p.m., Sept. 2	Pike road	G. W. Stivalley, Aud.
Ind.,	Lebanon	1 p.m., Sept. 2	Roads in two townships	D. M. Clark, Aud.
Ind.,	Madison	1.30 p.m., Sept. 2	Gravel road in Hanover	A. M. Taff, Aud.
Ind.,	Rockville	1.30 p.m., Sept. 2	Gravel road, 4,000 lin. ft	J. E. Elder, Co. Aud.
Ind.,	Lawrenceburg	noon, Sept. 2	Concrete retaining wall	W. S. Fagaley, Aud.
N. J.,	Paterson	4 p.m., Sept. 2	Macadam, 16,000 sq. yds	H. J. Harder, City Engr.
Md.,	Princess Anne	noon, Sept. 2	State aid highway, 2 miles	R. F. Maddox, Clk.
Ind.,	Bedford	1 p.m., Sept. 2	Gravel or macadam roads	E. W. Edwards, Co. Aud.
N. J.,	Elizabeth	4 p.m., Sept. 2	Culverts	J. L. Bower, Co. Engr.
N. J.,	Totowa	8 p.m., Sept. 2	Improving streets	W. R. Hudson, Mayor.
N. J.,	Passaic	2 p.m., Sept. 3	Plank floor for bridge	W. T. McGee, Ch. Comrs.
Ind.,	Wabash	1.30 p.m., Sept. 3	Gravel road, 3 miles	W. C. Miller, Co. Aud.
Ia.,	Des Moines	9 a.m., Sept. 3	Sheet asphalt or bitulithic	H. Susong, City Clk.
Ind.,	Crownpoint	Sept. 3	Gravel road	C. A. Johnson, Co. Auditor.
Ind.,	Valparaiso	2 p.m., Sept. 3	Gravel road; cost, $3,900	C. A. Blanchly, Co. Aud.
Ind.,	Shelbyville	10 a.m., Sept. 3	Paving, 12,000 lin. ft	F. W. Fagel, Co. Aud.
Cal.,	Riverside	Sept. 3	Concrete macadam, 6,900 lin. ft	Supervisors.
Md.,	Baltimore	11 a.m., Sept. 3	Granite block, vitrified brick, sheet asphalt	R. K. Compton, Ch.
Ky.,	Louisville	Sept. 3	Sheet asphalt, cost $63,000	Board Pub. Works.
Ia.,	Des Moines	9 a.m., Sept. 3	Sheet asphalt or bitulithic	J. R. Hanna, Mayor.
Cal.,	Riverside	Sept. 3	Bituminized surface concrete	Supervisors.
Ind.,	Wabash	1.30 p.m., Sept. 3	Gravel road on County line	D. Showalter, Aud.
Ind.,	Bloomington	2 p.m., Sept. 3	Two roads	W. F. Kinser, Aud.
Ind.,	Covington	1.30 p.m., Sept. 3	Three highways	W. G. Gray, Co. Aud.
Ind.,	Sullivan	noon, Sept. 4	Stone and gravel road	W. S. Picknell, Aud.
Ky.,	Louisville	Sept. 4	Vitrified brick, cost $29,500	Board Pub. Works.
O.,	Columbus	noon, Sept. 4	Macadamizing two roads	John Scott, Co. Clk.
Ohio,	Canton	Sept. 4	Massillon-Navarre Road, 2 miles	
Ind.,	Fort Wayne	7.30 p.m., Sept. 4	Improving 11 streets	F. T. Benoy, Ch.
Ill.,	Rockford	1.30 p.m., Sept. 4	Vitrified brick, 16,000 yds.; 9,000 ft. curb and gutter	W. W. Bennett, Pres.
Kan.,	Dodge City	6 p.m., Sept. 5	Vitrified brick	S. Gallagher, City Clk.
N. J.,	Roselle	8 p.m., Sept. 5	Concrete sidewalks	J. L. Bower, Boro. Engr.
O.,	Columbus	Sept. 5	Macadam	Co. Comrs.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Ind.,	Logansport	11 a.m., Sept. 5	County line highways	J. E. Walls, Co. Aud.
Ohio,	Cincinnati	noon, Sept. 5	Improving Kemper Road	S. Struble, Pres.
Ind.,	Brazil	11.30 a.m., Sept. 5	Paving highway	E. A. Staggs, Co. Aud.
Ind.,	Corydon	2 p.m., Sept. 5	Paving highway	J. L. Bannon, Co. Aud.
Ill.,	Huntley	5 p.m., Sept. 5	Water bound macadam, 3,000 sq. yds.	M. Cruikshank, Vil. Clk.
O.,	Columbus	10 a.m., Sept. 5	Water bound macadam, 1 mile in Milan. Water bound macadam, 1.5 miles in Huron. Water bound macadam, 1.25 miles in Moorfield. Water bound macadam, 3.41 miles in Lick. Concrete, 1.27 miles in Marietta. Brick, 1.14 miles in Malta.	J. R. Marker, State Hwy. Comr
Ore.,	Olympia	Sept. 6	Highway; cost, $60,000	State Highway Comr.
Wis.,	Racine	10 a.m., Sept. 6	Paving two streets	P. J. Connolly, City Engr.
La.,	Lake Charles	Sept. 7	Wood, brick, asphaltic concrete, 84,000 yds.	C. M. Richard, Vil. Clk.
Ark.,	Jonesboro	Sept. 7	Vitrified brick, 10,000 sq. yds.	B. H. Berger, Secy.
Tenn.,	Memphis	11 a.m., Sept. 8	Cement pavement, 52,500 sq. ft.	W. L. Thompson, Chief Eng.
N. Y.,	Tonawanda	Sept. 8	Paving two streets; cost, $65,800	Bd. Pub. Wks.
N. J.,	Montclair	8 p.m., Sept. 8	Pavement	Town Clerk.
La.,	New Orleans	noon, Sept. 8	Highway, 12 miles	State Engr.
Fla.,	Lake City	8 p.m., Sept. 8	Cement sidewalks, 3,500 sq. yds.	Bond Trustees.
S. D.,	Selby	2 p.m., Sept. 9	Cement sidewalks	H. A. Taylor, Co. Auditor.
Ark.,	Jonesboro	Sept. 10	Vitrified brick, 10,000 sq. yds.	B. H. Berger, Comr.
Wash.,	Spokane	Sept. 10	Highway, 20 miles; cost, $73,000	County Comrs.
O.,	Cincinnati	noon, Sept. 12	Repairing and draining roads	S. Struble, Pres.
N. Y.,	Middletown	Sept. 15	Road, one mile	C. H. Smith, Supt.
Ind.,	Shelbyville	10 a.m., Sept. 15	Gravel road on county line	F. W. Fagel, Co. Aud.
Ind.,	South Bend	Sept. 15	Paving highway	C. Sedgwick, Co. Auditor.
O.,	Toronto	noon, Sept. 15	Turnpike	S. Wilkinson, Ch. Comrs.
Mo.,	Cape Girardeau	Sept. 15	Concrete paving, 14,000 yds.	F. A. Kage, Mayor.
Canada,	Cayuga	noon, Sept 16	Macadam roads, 26½ miles	T. A. Schnider, Clk.
O.,	Fostoria	Sept. 18	Brick or sheet asphalt, 8 blocks	C. A. Latshaw, City Engr.

SEWERAGE

O.,	East Youngstown	Aug. 31	Sewer in Gordon ave	T. J. Carney, Vil. Clk.
Minn.,	Casson	8 p.m., Sept. 1	Sewers and disposal plant	G. R. Little, Vil. Recorder.
Fla.,	Florida	7.30 p.m., Sept. 1	Storm sewers, 6,000 ft. 12 to 24-inch	J. N. Hazlehurst, Engr.
Ia.,	Walcott	8 p.m., Sept. 2	Pipe sewers, 2½ miles 8 to 15-inch and disposal plant	J. H. Stouffer, Twn. Clk.
Minn.,	New Ulm	5 p.m., Sept. 2	Sewer in Minnesota St.	A. J. Meyer, City Clk.
Minn.,	Morristown	8 p.m., Sept. 2	Relaying sewer	W. S. Farrington, Vil. Clk
Wis.,	New London	Sept. 2	Sewers in 3 streets	P. J. Thompson, City Clk.
Ia.,	Jackson	Sept. 2	Sewers, 5 miles	W. E. Thomas, City Clk.
N. J.,	Paterson	4 p.m., Sept. 2	Sewers in several streets	J. H. Harder, City Engr.
Iowa,	Walcott	8 p.m., Sept. 2	2½ miles sewers and disposal plant	J. H. Stouffer, Town Clk.
S. D.,	Clarkson	8 p.m., Sept. 2	Pipe sewer, 4-inch	A. F. Grimm, Mayor.
Wis.,	New London	8 p.m., Sept. 2	Sewers in three streets	C. J. Thompson, City Clk.
Miss.,	Louisville	Sept. 2	Sewer and water system; cost, $32,000	W. J Newsam, Mayor.
Mich.,	Ann Arbor	7.30 p.m., Sept. 3	Vitrified pipe, 1½ miles of 8-inch	M. Osgood, City Engr.
Ia.,	Creston	8 p.m., Sept. 3	Vitrified pipe sewers	J. F. Golden, City Clk.
Md.,	Baltimore	11 a.m., Sept. 3	Storm drains	Bd. Awards.
O.,	Toledo	Noon, Sept. 4	Local sewers	F. G. Stockton, Sec.
Ia.,	Spencer	8 p.m., Sept. 5	Sewer, 872 lin. ft.	E. M. Smith, City Clk.
Mo.,	St. Louis	noon, Sept. 5	Second section Glaise Creek sewer	Bd. Pub. Imps.
N. Y.,	Brooklyn	11 a.m., Sept. 5	Sewers in number of streets	L. H. Pounds, Pres.
Mont.,	Malta	Sept. 6	Sewer system and water works	City Clerk.
Wis.,	Racine	Sept. 6	Pavements and sewers	Bd. Pub. Wks.
La.,	Lake Charles	Sept. 7	Storm sewers, 6 miles	C. M. Richards, City Clk.
Ohio,	Toronto	noon, Sept. 8	Main sewer	James Connor, Vil. Clk.
N. J.,	Camden	Sept. 8	Clay pipe, 1,612 lin. ft.	Boro. Council.
N. J.,	Newark	2 p.m., Sept. 9	Outfall pressure tunnel	Passaic Valley Sewerage Cmrs
Neb.,	Alliance	noon, Sept. 12	Laterals; cost, $830	J. D. Emerick, City Clk.
Mo.,	St. Louis	noon, Sept. 12	Third section Glaise Creek sewer	Bd. Local Imps.
O.,	Delaware	Sept. 14	Vitrified pipe, 600 ft. 8-inch	G. S. Erwin, City Engr.
N. C.,	Raleigh	Sept. 15	Sewer and water mains	Riddick & Mann, Engrs.

WATER SUPPLY

D. C.,	Washington	Aug. 31	Valves, 3 and 4-way castings	Pur. Agt.
Can.,	Milestone	Aug. 31	Concrete reservoir	W. P. Daniels, Engr.
Tex.,	Belton	8 p.m., Sept. 1	Concrete reservoir, pump house, cast-iron pipe, etc.	Neal Bassel, Mayor.
D. C.,	Washington	Sept. 1	Installing two electrically-driven pumps at Louisville	Comrs. of Fisheries.
Miss.,	Georgetown	Sept. 1	Water works	D. Mahaffy, Twn. Clk.
Mich.,	Holland	Sept. 1	Motor-driven centrifugal pump, 1,100 gals. per min.	R. B. Champion, Supt.
N. Y.,	New York	11 a.m., Sept. 2	Hydro-electric power equipment, 250 k. w.	Bd. Water Supply.
N. Y.,	Niagara Falls	4 p.m., Sept. 2	Water main in 27th St.	F. S. Parkhurst, Jr., City Eng.
Mo.,	St. Louis	noon, Sept. 2	Gate chamber in clear well	E. R. Kinsey, Pres.
Miss.,	Louisville	Sept. 2	Water works and sewerage; cost, $32,000	Mayor W. J. Newsam.
Ill.,	Maple Park	6 p.m., Sept. 3	Wood or steel tank	R. S. Harter, Vil. Clk.
Minn.,	Grand Forks	Sept. 4	Water main	C. J. Evanson, City Aud.
Mont.,	Malta	Sept. 6	Water works and sewer system	City Clk.
Ill.,	Taylorville	1 p.m., Sept. 8	Pumping engine, 750,000 gal., buildings, power plant, etc.	W. M. Brovine, Mayor.
Md.,	Baltimore	Sept. 10	Several pumps and electrical equipment	Bd. of Awards.
Mass.,	Boston	11 a.m., Sept. 13	Fuel oil storage tank	H. R. Stanford, Chief, Wash't
Fla.,	Jacksonville	10 a.m., Sept. 15	Galvanized iron and lead pipes, pig lead	W. M. Bostwick, Jr. Ch.
Md.,	Silver Spring	Sept. 15	Pumping engine	Silver Spring Water Co.
N. C.,	Bloomsbery	Sept. 15	Water pipe, 15,000 ft.; sewer, 10,000 ft.	J. H. Pou, Raleigh.
Ill.,	Assumption	Sept. 19	Water main, 16,500 ft. 6-inch	R. F. Johnson, Secy.

LIGHTING AND POWER

N. Y.,	New York	11 a.m., Sept. 2	Portable air compressing plant	J. P. Morrissey, Secy.
Wis.,	Eau Claire	3 p.m., Sept. 2	Electric and gas lighting	J. C. Fennesy, City Clk.
Pa.,	Philadelphia	Sept. 3	Street lighting, any kind	H. Godfrey, Chief.
La.,	Lake Charles	Sept. 11	Supplying city with gas	City Clk.
Fla.,	Jacksonville	10 a.m., Sept. 15	Recording watt meters, 1,000	R. N. Ellis, Pur. Agent.
O.,	Akron	noon, Sept. 16	Two hydraulic turbines and generators, 250 & 75 K. V. A.	R. M. Pillmore, Dir.
N. J.,	Elizabeth	2.30 p.m., Sept. 22	Power plant at Tuberculosis Farm	J. M. Cady, Dir.

FIRE EQUIPMENT

Ala.,	Montgomery	Sept. 1	Motor chemical and hose; aerial truck, tractor for steamer	J. F. Browder, Chief.
Ind.,	Ft. Wayne	5 p.m., Sept. 2	Two motor chief's cars, 4 men, 40-H. P.	J. C. Hutzell, Ch. Bd.
Pa.,	Luzerne	7.30 p.m., Sept. 2	Fire hose, 300 ft. 2½-inch	R. J. Blair, Secy.
D. C.,	Washington	2 p.m., Sept. 2	Chemical fire extinguishing apparatus and alarm system.	L. C. Laylin, Secy.
Mass.,	Holyoke	2 p.m., Sept. 2	Equipment for fire house	Bd. Pub. Wks.
Ill.,	Springfield	noon, Sept. 2	Motor combination hose and chemical, chief's automobile.	H. B. Davidson, Comr.
Ill.,	Dixon	Sept. 3	Motor chemical and hose wagon	M. J. Gannon, Comr.
Cal.,	Pasadena	10 a.m., Sept. 9	Motor aerial truck, 2 motor combination wagons	Comrs.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
BRIDGES				
Pa.,	Scranton	10.30 a.m., Sept. 2	Rebuilding bridge	C. P. Savage, Co. Controller.
N. Y.,	Herkimer	2 p.m., Sept. 2	Concrete arch bridge	C. R. Halle, Twn. Clk.
O.,	Youngstown	Sept. 2	Bridge at Division St.	E. S. Smith, Co. Engr.
N. Y.,	Albany	noon, Sept. 3	Highway bridges, etc.	D. W. Peck, Supt. P. Wks.
Mass.,	Salem	9.30 a.m. Sept. 3	Reinforced concrete arches and abutments	M. Kimble, Ch. Comrs.
N.J.,	New Brunsw'k	2.30 p.m., Sept. 4	Repairing bridges	A. J. Gebhardt, Dir.
Ga.,	Trenton	noon, Sept. 6	Steel bridge	C. S. Turner, Ordinary.
Ohio,	Akron	11 a.m., Sept. 8	Abutment to bridge and culvert	J. Bower, Clk.
Iowa,	Charles City	noon, Sept. 11	Bridges and culverts	H. B. Rosencranz, Co. Aud.
Cal.,	Sacramento	Sept. 12	Concrete bridge over American River	Supervisors.
MISCELLANEOUS				
Minn.,	Duluth	11 a.m., Aug. 30	Two-passenger runabout	C. S. Palmer, Clk.
Wash.,	Spokane	Aug. 30	Alterations to city hall	City Clerk.
N. Y.,	Schenectady	3 p.m., Sept. 2	Miscellaneous improvements about jail	B. A. Farrell, Clk.
Minn.,	Biwabic	8 p.m., Sept. 2	Six-ton wagon scale	H. E. Reilly, City Clk.
Ind.,	Crawfordsville	10 a.m., Sept. 2	Road grader	B. B. Engle, Co. Aud.
Pa.,	Harrisburg	10 a.m., Sept. 2	Numbered aluminum plates, badges, etc.	E. M. Bigelow, Hwy. Comr.
Ohio,	Niles	noon, Sept. 3	Jail, four cells	J. E. Tregaskis, Clk.
N. J.,	Camden	3 p.m., Sept. 5	Motor combination ambulance and patrol	C. K. Deacon, Ch. Com.
Ind.,	Indianapolis	noon, Sept. 8	Automobile number plates, 60,000	L. G. Ellingham, Secy.
N. J.,	Garwood	8 p.m., Sept. 9	Removal of ashes and garbage	C. H. Keim, Boro. Clk.
Ind.,	Indianapolis	10 a.m., Sept. 10	Retaining wall	C. P. Patten, Co. Aud.
Cal.,	Sacramento	2 p.m., Sept. 12	Furnishings for court house	E. F. Pfund, Co. Clk.
Texas,	Dallas	Sept. 13	Jail	Co. Comrs.

STREETS AND ROADS

Decatur, Ala.—City of New Decatur has sold $150,000 worth of improvement bonds to Southern Asphalt & Construction Company of Birmingham, Ala., which company will do the paving.

Pine Bluff, Ark.—M. W. Ware, C. P. Clemmons, Creed Taylor, C. W. Butts, J. T. Cradford and Murel Franklin, commissioners of Road District No. 5, have sold bonds of district for amount necessary to build the road, which will run east from Pine Bluff to Noble Lake. Issue was $120,000. A Cleveland, Ohio, firm purchased the bonds at 95 cents.

Phoenix Ariz.—Considerable street improvements are being planned. City engineer has been instructed to prepare plans and specifications for grading of Robson, Macdonald and Center streets and their intervening cross streets.

Bakersfield, Cal.—Board of Trustees will shortly ask for bids for improving F st., from 15th to 28th sts., and of 18th st., from F to Cedar sts.

Chula Vista, Cal.—City is planning construction of boulevard system at estimated cost of $40,000.

Claremont, Cal.—City Trustees are making plans to improve Mesa ave. Estimated cost $14,000.

Los Angeles, Cal.—Paving of West First st. from Lakeshore to Vermont is being discussed.

Los Angeles, Cal. — Resolution has been adopted by City Council formally accepting specifications prepared by city engineer for lowering of grade of Broadway tunnel, the approaches of Broadway, between Temple St. and south portal of tunnel and of California St. Next step will be adoption by Council of ordinance of intention to make desired improvement. Cost will be approximately $115.000 and will be borne by an assessment district.

Los Angeles, Cal.—Petition has been filed with city clerk asking that Lemon Grove Ave., from Normandie Ave. to Kingsley Drive, and Ardmore Ave., from Melrose to Santa Monica Boulevard, be oiled and otherwise put in better condition.

Northside, Cal. — County Supervisors will build handsome driveway from Devil's Gate to Linda Vista.

Sacramento, Cal.—Big bond issue is proposed in Sacramento County for purpose of extending good roads system of county in all directions.

San Francisco, Cal.—Paving and improvement of San Bruno Ave., from Oakdale Ave. to Gavin St., is being urged.

Santa Monica, Cal.—Extension of Appian Way, paved boulevard running through Vicente Terrace and Seaside Terrace tracts to Colorado avenue and north to site of projected Mitchell and Lankershim Hotel site, is being boosted.

Bridgeport, Conn.—Resolution has been introduced authorizing appointment of Mayor Wilson and Charles G. Sanford as committee to dispose of $200,000 in serial notes for paving work.

East Hartford, Conn.—It has been voted to accept offer of Highway Commissioner Charles J. Bennett to extend warranite pavement south on Main st., from Hockanum river bridge to Glastonbury town line. Commissioner Bennett made offer to town to lay warrenite pavement from bridge south to town line, distance of about 14,000 ft., for cost of $1 per lin. ft. to the town. After pavement is laid state will keep road in repair.

Middletown, Del.—At a meeting of Town Commissioners it was decided to advertise for bids for surfacing with stone East Main street from the center of square to the Odessa road. It is estimated that work will cost about $7.000.

Wilmington, Del.—The Farmers' Bank has agreed to take $100,000 of highway improvement bonds.

Jacksonville, Fla.—Sum of $29.000 being available for permanent street paving, City Council members will prepare list of preferred streets.

Orlando, Fla.—Bond issue of $100,000 has been voted for building of brick streets.

East St. Louis, Ill.—Board has decided to pave Lynch avenue from Eighth to Ninth street at estimated cost of $6,000.

Peoria, Ill.—Street committee has decided to draw report favoring drafting of ordinance providing for paving of Glendale ave., from Jackson to Spring st. Improvement as planned will cost $36,340.

Peoria, Ill.—Board of Local Improvements has voted for paving of Frink st., from College to Columbia Terrace. The work will cost $12,737.70, representing a cost of $3.42 per front foot.

Bedford, Ind. — Lawrence County, Shawswick Township, gravel roads bonds for $2,900, running ten years and bearing 4½ per cent. interest, have been sold to Thomas A. Holland for $2,901.30.

Dodge City, Kan.—Ordinance has been passed ordering paving of Third avenue.

Louisville, Ky.—Another big block of street reconstruction work has been decided upon by Board of Public Works. Market st., from Third to Fifth sts., and Fourth st., from Main to Market sts., will be reconstructed with wood blocks. Bids will be opened on this work about Sept. 4. It will cost approximately $21,000.

Baltimore, Md.—Bids will be opened shortly by Board of Awards for Paving Contract No. 126, for Commission for Opening Streets. Eight streets are embraced in this contract and approximately 22,800 sq. yds. of bituminous concrete will be used. Streets to be paved under this contract are: Ellamont, from North Ave. to Baker St.; Rosedale, North to Baker; Braddish, North to Baker; Whitmore, North to Westwood; Smallwood, Westwod to Presbury; Presbury, Ellamont to Windsor Mill road; Presbury, Smallwood to Warwick, and Westwood, Smallwood to Warwick.

Haverhill, Mass. — Resurfacing of streets is being considered.

Grand Rapids, Minn.—Bond issue of $300,000 for roads has been carried.

St. Paul, Minn.—According to plans, $797,834.05 worth of paper will be disposed of by City Comptroller Handy on Aug. 27, at noon. The lot includes the Robert street bonds, amounting to $523.-484.05, and the Summit avenue bonds, totaling $274,350.

Waynesboro, Miss.—Board of Supervisors of Wayne County has ordered a $100,000 bond issue for good roads.

St. Joseph, Mo.—City Engineer has been ordered to prepare ordinance for sidewalks on 17th, between Frederick and Buchanan aves.

St. Louis, Mo.—Bids are being received for improving Camellia ave., from Margaretta to Lee ave., by grading, curbing and paving with bitulithic surface on concrete base. W. T. Findly is Secy. of Bd. of Public Works.

Manchester, N. H.—Resolution for issue of $100.000 of municipal street and sewer bonds has been passed by Board of Common Council.

Camden, N. J.—Ordinance has been passed directing paving of Mt. Ephraim ave., from the end of the stone paving at Pear st. to Thurman st. and Butler st., with stone blocks.

Camden, N. J.—Ordinance has been passed designating certain streets to be paved during the year 1913.

Irvington, N. J.—Ordinances have been adopted for improvement of various streets. D. H. Greene is Mayor.

Long Branch, N. J.—According to figures filed with City Clerk by City Engineer J. W. Seaman, total cost of bitulithic resurfacing of Broadway, Third and Second Aves., as well as for completed street for Third Ave. extension and Rockwell Ave., is $145,000. Net cost of the resurfacing is $111,968.60, the sum of $8,880.69 to be met by corporation using streets.

New Brunswick, N. J.—At meeting of Board of Freeholders the $143,500 bond issue for road improvement throughout county were sold to R. M. Grant & Co., of New York, at a premium of $972.93.

Perth Amboy, N. J.—Resolution has been adopted for paving of Brighton avenue with asphalt paving blocks. Wilbur La Roe is City Clerk.

Westfield, N. J.—Improvement of Lawrence Ave. is being considered.

Albany, N. Y.—Commissioner John N. Carlisle of State Highway Department has completed apportionment of second $50,000 000, which was authorized in referendum in 1912 to be used for construction and improvement of highways.

Binghamton, N. Y.—The proposed widening of Court St will cost city $961 25, according to report of committee filed with City Clerk. Project for widening this street between Griswold and Oliver Sts., has been under consideration for some time.

Rochester, N. Y.—Widening of Snyder st. is being considered.

Syracuse, N. Y.—Bids for paving Tompkins street from Milton avenue to Wilburg avenue have been received by Board of Contract and Supply. Contract is one of four for paving of Wilbur avenue, Tompkins street and Milton avenue from Gifford street along the route of the Solvay division of the New York State Railways to Chemung street. The bids were as follows: Uniform pavement with stone curbing under two years' guaranty for brick and sandstone block and five years' guaranty for asphalt—F. J. Baker, $36,832.10 for sandstone blocks; $26.467.10 for vitrified brick and $23,619.70 for asphalt; John Young, $33,855 for sandstone block and $25,470 for vitrified brick. Combination of sandstone block on grades of 5 per cent or over and in the

railway strip and asphalt on the sides of the street—F. J. Baker, $31,158.30 under two and five years' guaranty and $31,327.80 under two and ten years' guaranty. Uniform pavement with stone curbing under two and ten years' guaranty—F. J. Baker, $26,832.10 for sandstone block; $26,467.10 for vitrified brick and $23,757.70 for asphalt.

Roswell, N. Mex.—The proposed pavement of Third to Pennsylvania, part of Richardson avenue from First to Fifth street from a point 50 feet south from Third street to Fourth street north will be ordered.

Cincinnati, O.—Surveyor Cowen has reported that he estimates cost of repair and improvement of Lawrenceburg road from Suspension Bridge to Indiana line at $35,399.60. Commissioners have ordered plans and specifications prepared.

Cincinnati, O.—Petitions for improvement of Plainfield road by widening and macadamizing, from Montgomery Pike at Silverton to Woodford Road at Kennedy, and from Ewendale Road to Plainfield schoolhouse, have been received and Surveyor has been directed to prepare estimate and report.

Steubenville, O.—The $35,000 Croxton's Run pike five per cent bonds have been awarded to Miners' and Merchants' Exchange Bank of Smithfield on premium of $101.50. There was only one bid.

Youngstown, O.—The City Savings and Trust Bank has purchased bonds to amount of $5,000 covering city's portion of Jackson st. and Chalmers ave. paving bonds, covering intersections and sidewalks.

Portland, Ore.—County Surveyor of Multnomah County is planning the construction of six miles of road between Portland and Bridal Veil. Philip Holbrook is County Surveyor.

Chartiers, Pa.—Commissioners of Chartiers township have passed ordinance authorizing grading, curbing and paving of Idlewood avenue, East Carnegie from Scott township line to Bell avenue.

Chester, Pa.—Ordinance providing that 11th street, from Highland avenue to Harwick street, be laid out on city plans has been passed finally.

Erie, Pa.—Ordinances are being considered for paving of various streets.

Harrisburg, Pa.—Election will be held in the fall for voting on $50,000 loan for paving street intersections.

York, Pa.—County Commissioners have signed agreement for construction of stretch of good road in borough of Hanover under supervision of State Highway Department. Improvements are to be made on York st. from borough limits to Abbottstown st., distance of 3,155 ft.

York, Pa.—Mayor Lafean has signed Select Council bill No. 43, authorizing paving of West Market st., from West st. to Belvidere ave.

Loudon, Tenn.—Bids for recent issue of $150,000 five percent 30-year pike road bonds have been opened. There were three bidders for these bonds, successful contestant being C. L. McNear, of Chicago.

Corpus Christi, Tex.—Widening and paving of Railroad ave. have been authorized.

Aberdeen, Wash.—Resolutions have been passed for improvements of Market st., Heron st. and East Wishkal, East Heron and Kansas sts. L. D. Kelsey is City Engineer.

Chehalis, Wash.—Paving of Washington street and numerous cross streets have been authorized.

Olympia, Wash.—Plans have been approved for four-mile stretch of Sunset highway from Gold Creek to end of state road constructed in Kititas county.

Olympia, Wash.—State Highway Board has approved of plans for "waterfront" portion of Pacific highway south of Bellingham.

Tacoma, Wash.—Plans and character of road construction advocated by Seattle-Tacoma Rainier National Park Committee for national park roads and for roads leading to park have been approved by Secretary of Interior Franklin K. Lane.

Janesville, Wis.—Sidewalks have been ordered built on both sides of Racine and Galena Sts., between Racine St. bridge and South Main and South River Sts.

Racine, Wis.—Two plats have been approved by street committee, these being South Lawn Addition, No. 2, and W. G. Gittings plat. Grading of Washington ave., from the cemetery to Blaine ave., has been recommended, as were following improvements: Paving of Grange ave., from St. Paul tracks to 20th st.; grading of Carmel ave.; changing of the curb line on Maple st.; sewer on 13th st., from Horlick ave. east two blocks; public sewer on De Koven ave., Racine to Mead st.; sewer on Gould st. as far as Walton ave.; paving of Howe st., 13th to 14th st.

CONTRACTS AWARDED.

Gadsden, Ala.—To R. M. Hudson of Atlanta, tentative contract for paving of Walnut st. and Forest ave. Total cost of work will be approximately $40,000.

Pine Bluff, Ark.—By Improvement District No. 5 contract for about 20 miles of macadam road between Pine Bluff and Tamao to E. A. Hensley at $109,000.

Los Gatos, Cal.—Contract for paving main streets of Los Gatos has been awarded to Blanchard, Brown & Co., a corporation, of San Francisco. Blanchard, Brown & Co.'s bid is for $54,305.08. Itemized it is as follows: Pavement, 333,469.49 sq. ft. at 14 cts, $46,685.72; curbs, 16,351 lin. ft. at 20 cts., $3,270.20; gutters, 35,614.60 sq. ft., at 10 cts., $3,561.46; corrugated iron culverts, 6x20, 592.10 lin. ft., at $1, $592.10; corrugated iron culverts, 8x30, 56 lin. ft., at $1, $56; 10-in. vitrified sewer pipe, 86 lin. ft., at 50 cts., $43; 12-in. vitrified sewer pipe, 88 lin. ft.,a t 70 cts., $61.60; 7 storm water inlets at $5, $35. Second lowest bid was submitted by the Barber Asphalt Co. and totaled $58,057.25.

San Diego, Cal.—By City Trustees contract for paving various streets in East San Diego to Tingley & Daley, San Diego, at $41,268.

South San Francisco, Cal.—For about one mile of asphaltic concrete paving on Grand avenue to Federal Construction Co., San Francisco, at $55,773.

San Jose, Cal.—The Federal Street Improvement Co. has made lowest bid, $3,346.41, for street paving on San Fernando St., from Delmas Ave. to the Los Gatos Creek.

New Haven, Conn.—For paving on Dixwell ave., to Union Paving Co., Schenectady, N. Y., at $1.56 per sq. yd. F. L. Ford is City Engr.

Boise, Idaho.—By City Council, contract for paving in Local Improvement Dist. No. 20, to Barber Asphalt Paving Co., at approximately $76,000. C. C. Stevenson is City Engr.

Prophetstown, Ill.—For paving of four blocks to Thomas Cary & Sons, of Clinton, for $16,216.

Urbana, Ill.—By Board of Local Improvements, contract for paving Illinois st. and Cottage Grove ave., to J. W. Stipe at about $37,000. Brick block on a 6-in. base will be used.

Corydon, Ind.—By Commissioners of Harrison County, contract for construction of road in Heth Township, to Arthur S. Miller, Mauckport, Ind., at $11,105. J. L. O'Bannon is Auditor.

Huntington, Ind.—For construction of Huntington Ave. road to Arley H. Fry of Bluffton, Ind., at $9,495.

Fort Dodge, Ia.—By City Council contract for several thousand feet of cement sidewalk to E. J. Conway & Co. for the work in District No. 1 at 9.9 cts. a ft., and to the Jensen Sidewalk Co. at 10.4 cts. for District No. 2.

Knoxville, Ia.—By City Council contract for about 18,690 sq. yds. asphaltic-concrete pavement on various streets to James Horrabin & Co., Des Moines, Ia., at $41,820.

Hiawatha, Kan.—For construction of 12,000 sq. yds. of Dolarway pavement to Lee Burke, of Anderson.

Hutchinson, Kan.—For laying concrete sidewalks to J. M. Halloway at 6½ cts. per sq. ft.

Baltimore, Md.—Bids opened by Board of Awards for Paving Commission Contract No. 70 show Southern Paving & Construction Co., of Chattanooga, to be lowest bidder. Bid of this concern, which only recently entered local paving field, was $1.62 per sq. yd. for sheet asphalt, $1.55 for bituminous, $2,30 for vitrified brick and $3.75 for Belgian block. The Baltimore Asphalt Block & Tile Co., the next lowest bidder, quoted $1.78, $1.55, $2.25 and $3.70, respectively, for contract. There were but two bidders for wooden block contract No. 69 for the paving commission. The George Long Contracting Co. is apparently lowest bidder at $3.05 a sq. yd. Patrick F. Reddington quoted $3.15 a sq. yd. But two bids were submitted for Commission for Opening Streets Contract No. 124. For this contract, which calls for use of bituminous concrete, Baltimore Asphalt Block & Tile Co. is apparently lowest bidder at $1.65 a sq. yd. P. Flanigan & Sons, next lowest, bid $1.72.

Adams, Mass.—By State Highway Commission for constructing road between Adams and Florida to W. T. Adams of Canton, Mass., at following bid: 12 acres clearing and grubbing, $1.50; 36,500 cubic yards excavation, 54 cents; 18,000 cubic yards excavation, ledge, $1.65; 3,000 cubic yards borrow, 70 cents; 400 cubic yards masonry, cement concrete, $7.50; 100 linear feet iron corrugated pipe, 12-inch, $1.25; 800 linear feet 16-inch, $1.50; 50 linear feet 24-inch, $3.00; 400 linear feet 18-inch, $1.75; 10,200 linear feet rustic guard rail, 18 cents; 1,400 linear feet standard guard rail, 30 cents; 2,500 linear feet stock fence, 12 cents; 1,400 cubic yards stone fill, $1.00; 50 square yards rock slope, $1.50; 50 cubic yards rock slope wall masonry, $6.00; 20 cubic yards Portland cement rubble masonry, $10.00; 60 number bounds, each $4.50; total, $63,736.

Monroe, Mich.—By Common Council contract for paving various streets to H. J. Keough, Detroit, Mich., at $35,000.

Marshall, Mo.—For construction of 13,000 sq. yds. of Dolarway pavement to J. M. Clack, of Nevada, Mo., at $1.43 per sq. yd.

Bayonne, N. J.—Contracts totalling $37,160.16 for street improvement have been awarded to Uvalde Asphalt Paving Co. by Bayonne City Council. They were 42d street for $4,892.76; 28th street for $7,364.80; Session court for $3,686.60, and 51st street for $21,216.

Bloomfield, N. J.—By Town Council contract for paving Dodd street to Standard Bitulithic Company at $6,373.16.

Mickleton, N. J.—To Glassboro Paving Company contract for construction of concrete bridge at Mickleton.

Oaklyn, N. J.—To Stutzer Contracting Co. contract to pave with concrete Clinton avenue, from White Horse Pike to Newton avenue, Oaklyn.

Riverside, N. J.—By Riverside Township Committee a $32,400 contract for sidewalk improvements to Banks & Kalback, of Wildwood.

Trenton, N. J.—To Newton Paving Co. for paving of Lamberton street, from Ferry street to Cass street, and of Grand street, from Cass street to Liberty street. Both streets will be paved with bituminous concrete on 5-in. concrete base, and Star asphalt, guaranteed for five years, will be used Total cost of Lamberton street will be $22,333.70, of which the Public Service Railway will pay $15,118.20 and balance, $7,215.50, will be assessed against the abutting property owners and city at large. The Grand street paving cost will be $18,035.95, of which Public Service Railway will pay $10,453, and balance, $7,582.95, will be assessed against abutting property owners and city at large.

Auburn, N. Y.—Contract for paving of Easterly ave., from Chedell pl. to Westlake ave. has been awarded by Common Council to Brayer Bros., of this city, low bidders. Contract price is $7,878.57, bids having been made on individual items.

Brooklyn, N. Y.—Bids have been opened by Borough President Connolly of Queens for seven highway jobs. Work to be done and the lowest bidder was as follows: For the construction of a concrete wing wall along Jackson ave., between Shell road and Flushing Bridge, Second Ward, Public Works Contracting Co., $4,241.50. For regulating, grading, curbing and laying sidewalks and crosswalks in Pettit place (Newtown ave.), from Ithaca (Fourth) st. to Broadway, Second Ward, Public Works Contracting Co., $5,279.30. For regulating and grading Skillman place, from Jackson ave. to Hunter ave., and in Hunter ave., from Skillman place to Academy st., and curbing and laying sidewalks on the northerly side of Skillman place, from Jackson ave. to Hunter ave., and on both sides of Hunter ave., from Skillman place to Academy st., First Ward, George T. McCarthy, Jr., $1,475. For laying a permanent asphalt pavement on a concrete foundation in Prospect st., from Freeman ave. to Webster ave., First Ward, Hastings Pavement Co., $5,313. For regulating and paving with sheet asphalt on a concrete foundation in Norman st., from Wyckoff ave. to Cypress ave., Second Ward, Borough Asphalt Co., $5,405. For rebuilding the sea wall on the west side of the boulevard, from a point 100 feet south of Jamaica ave. to a point 200 feet north of Temple st., First Ward, Public Works Contracting Co., $13,789.50. For completing the abandoned contract executed by the Newtown Paving Co., to regulate grade and repave with asphaltic concrete, upon a macadam foundation, in Shell road, from Thompson ave. to Jackson ave., Second Ward, James J. Barrett, $19,746.

Buffalo, N. Y.—Contract has been awarded by Highway Commissioner J. N. Carlisle to Albert H. Meyers, of Williamsville, for building Erie ave. state road. His bid of $68,856.90 was lowest.

Hornell, N. Y.—To Swank & McIntyre of Buffalo contract for paving East ave. by Board of Public Works. The contract price was $25,431.55.

Mamaroneck, N. Y.—To M. Deccicco, of Larchmont, contract for grading, macadamizing and improving Chatsworth ave., from Larchmont village line to Highland ave., Woods of Larchmont. Mr. Decicco submitted lowest bid on class of improvement Town Board desired—a macadam road with bituminous binder.

Belden, O.—By Board Trustees Grafton township at Belden for grading, draining and macadamizing roads. Sections 1 to 7, in all about 40,935 feet, to Kennedy-Warner Co. of Medina at $35,-227.

Canton, O.—Contract for construction of paved road from corporation line of Canton to the Perry Township line on Canton-Massillon road, has been let by County Commissioners to Campbell & Downs Construction Co., of Canton, Wednesday.

Clyde, O.—By Village Council contract to Rinelspach & Thoma, Fremont, O., at $8,700 for brick paving in Cherry street.

Columbus, O.—By State Highway Commissioner for grading and paving 1.06 miles of the Cincinnati, Zanesville road with concrete to Oather M. Junk, Chillicothe, O., at $13,975. Other bidders were P. Brewer, Chillicothe, $14,476; Appenzeller, Dilhoff & Karsh, Greenville, O., $13,990.

Norwalk, O.—By Director of Public Service contract to Buckeye Engineering Co., city, at $11,183.64 for brick paving in Whittlesey avenue.

Portland, Ore.—By City Council, contract for paving Willamette Boulevard, from Wabash ave. to city limits, to Warren Construction Co., at $76,550. Thomas M. Hurlbut is City Engr.

Gilbertsville, Pa.—To Eastern Construction Company by Montgomery county contract for building six miles of Colebrookdale and Limerick Turnpike road from Gilbertsville to Limerick Center.

Scranton, Pa.—Contract for paving New York avenue from Adams avenue to stove works, distance of one block, has been awarded to Sweeney Brothers, of Scranton.

Memphis, Tenn.—By City Commission paving contracts as follows: Regent Pl., between Race and Orleans Sts., and Race St., between McLemore Ave. and Regent Pl. to the J. E. Pollard Construction Co. for $4,887 and $1,885.60, respectively; Cambridge Ave., between Wellington St. and the Parkway, to R. D. Barclay for $8,254.73; Vine St., between Olive Ave. and the Parkway to G. O. White for $5,614; also contracts for construction of Dolarway pavement have been awarded as follows: 5,000 sq. yds. to L. W. Johnson, of Memphis, at $1.33 per sq. yd. and 10,000 sq. yds. to H. B. Fowler, of Memphis, at $1.29 per sq. yd.

Denison, Tex.—Contract for paving Gandy street with 2-inch bituminous top on 5-inch concrete base has been awarded to Murphy-Moulton Company of that city at following prices: Common excavation, 7,600 cubic yards, 50 cents; finished pavement, 30,700 square yards, $1.35; combined curb and gutter, 6,522 lineal feet, 50 cents; plain curb, 35 cents; guttter, 18 inches wide, 6,544 lineal feet, 25 cents; 3x12-inch oak headers, 1,070 lineal feet, 25 cents; time, 120 days. J. C. Feild is City Engineer.

American Fork, Utah. — Contract for sidewalk paving district No. 2 of American Fork, consisting of six or seven miles, has been awarded to Boley & Singleton, local men, their low bid being $18,049, or 9.4 cts. per sq. ft.

Aberdeen, Wash.—For construction of concrete pavement on East Wishkah, East Heron and Kansas sts., to Grays Harbor Construction Co., of Hoquiam, Wash. Following are bids received: (a) Harbor Paving Co.; (b) Grays Harbor Const. Co.; (c) Haukeli Hegg & Co.—Clearing and resetting all castings (lump sum), (a) $200, (b) $100, (c) $575; 2,800 cu. yds. subgrading, (a) $1.120, (b) $560, (c) $1.400; 12,800 sq. yds. 7-in. concrete pavement, (a) $15,360, (b) $14,720, (c) $14,976; 9,000 sq. yds. 8-in. concrete pavement, (a) $11,700, (b) $11,340, (c) $11,-430; 4,000 lin. ft. combined curb and gutter (plain), (a) $1,400, (b) $2,000, (c) $2,-000; 2,950 lin. ft. combined curb and gutter (armoured), (a) $1,475, (b) $2,065, (c) $2,065; 450 lin. ft. combined curb, returns and gutter (armoured) (a) $270, (b) $315, (c) $315; 5,500 lin. ft. wood stop, (a) $1,387.50, (b) $1,387.50, (c) $1,387.50; 11 monuments, (a) $55, (b) $82.50, (c) $55; 40 inlets with pipe to C. B., (a) $1,400, (b) $600, (c) $660; 650 lin. ft. 6-in. vitrified pipe, (a) $227.50, (b) $195, (c) $195; 2,700 lin. ft. 4-in. vitrified pipe, (a) $945, (b) $675, (c) $567; 1,450 lin. ft. armoured exp. joint, (a) $580, (b) $275, (c) $362; totals, (a) $36,120, (b) $34,315.50, (c) $35,988.

Olympia, Wash.—By State Highway Board, two road contracts for Inland Empire highway, between Walla Walla and Waitsburg, to the Wilson-Bailey Construction Co., of Walla Walla, comprising total of $63,000. Work is to be grading, graveling and draining. Highway Board has authorized expenditure of $4,000 for improvement on McClellan Pass road, formerly known as State Road No. 1, near Enumclaw.

Seattle, Wash.—Lowest bid for paving of Westlake ave. N. is that of Ind. Asphalt Paving Co. at $57,933.92. For grading and concrete walks on 14th ave., lowest bidder was De Flong & Anderson at $32,657.54. For resurfacing W. 60th St., lowest bidder was Krogh & Jessen at $18,534.90. For grading 36th ave. S. W., F. A. Hadley was lowest at $16,263.75, and for grading Orchard st., H. Brice at $82,850.75.

Spokane, Wash.—By County Commissioners of Stevens County, to H. C. Root & Co., of Spokane, contract for building two miles of Addy-Gifford State Road. Bid was for $7,400. Work will begin in immediate future.

Spokane, Wash.—By City Council, contract for paving Market st., Hillyard, from South to Sanson ave., to Barber Asphalt Co., at $23,975. Bitulithic surface on concrete base will be used. Morton McCartney is City Engr.

Spokane, Wash.—For grading, curbing and sidewalking of Eighth ave., from Lindeke to Milton st., to Otto Hubenthal for $783. The estimate was $825. Bitchell Bros. won contract for curbing, sidewalking, crosswalking and building gutters on 20th ave., from Madelia to Perry st., price being $2,200. Mitchell Bros. also get grading of same street at price of $3,390. This also is same as city engineer's estimate.

Milwaukee, Wis.—By Highway Commissioners of Milwaukee county to Peter Schetter, West Allis, Wis., for grading 3½ miles of the Mukwanago road.

Superior, Wis.—E. Hawarden has been awarded contract for West Third St., which is to be paved with concrete from Stinton Ave. to Northern Pacific Railway tracks, a distance of 390 ft. The bid was $943.59. J. B. Palmer, the only other bidder, asked $1,315 for doing work. Streets to be improved in Norman district are Catlin Ave., 15th to 21st; Clough, Fisher and Weeks Aves., 18th St. to 21st St; 19th and 20th Sts.; Lamborn Ave. to Grand Ave.; Lincoln St., Baxter Ave. to Catlin Ave. P. E. Bergman with his bid of $6,219.33 was awarded the contract. Other bidders were: Peterson & Holm, $6,998.16; Otto Smith & Co., $6,391.66; T. G. Loughlin, $6,811.08; Russell Construction Co., $6,710.76; J. E. Erickson, $6,-710.76; Anderson & Johnson, $7,400.

Superior, Wis.—Five contracts for improvements to Douglas County highways, authorized by County Board, have been awarded to four contracting firms, entailing total expenditure of $5,874.65. Work on the roads will be commenced immediately and completed in the fall. For grading of three-quarters of a mile of road on Central State highway, Anderson & Johnson were awarded contract on their bid of $1,020. Only other bidder on the work was the Ed Thiede Co., of Hawthorne, the bid being $1,-255.50. The Ed Thiede Co. received the contract for grading first mile on the Nebagamon road, running from Hawthorne east. Bid was $1,266. Anderson & Johnson, the only other bidder, placed their estimate at $1,458.86. The Thiede Co. also obtained contract for grading second mile on the road, on a bid of $1,758.40. Anderson & Johnson turned in a bid of $2,115.82. C. B. Krogfors will grade the mile on the Black River Falls road along the south side of section 33, being awarded the contract on a bid of $850. Other bidders on this work were J. E. Erickson and S. B. Chaffey, their estimates being considerably higher. Grading of the second mile on the same road, running between sections 35 and 36, 47-15, will be done by S. B. Chaffey, who was lowest with a bid of $981.12. The only other bidder on this piece of work was J. E. Erickson, his price being $1,276.56.

Sandwich, Ont.—By City Council, contract for construction of 16,000 sq. yds. of concrete pavement to Thomas Chick, Windsor, Ont., at $26,000.

SEWERAGE

Huntington Beach, Cal.—City Engineer Fountain has completed plans for sewer system of Huntington Beach. Plans include septic tank. Main lines will extend from 13th street to Vista Del Mar. Estimated cost is $29,000. Project is to be voted on in immediate future.

Longbeach, Cal.—Citizens have voted to issue bonds for $340,000 for improving and completing main and supplementary outfall sewer system.

Bridgeport, Conn.—Resolution has been introduced authorizing appointment of Mayor Wilson and Charles G. Sanford as committee to dispose of $20,000 in serial notes for sewer construction.

Byron, Ill.—Election to bond city for purpose of putting in sewer system has been carried.

East St. Louis, Ill.—It has been voted to construct large sewer on Exchange avenue from Seventh to 19th street at cost of $11,900, sewer to be one of arms of outlet sewer.

Walcott, Ia.—Town will receive bids for about 2½ miles of 8 to 15-inch sanitary sewers and disposal plant. J. H. Stouffer is Town Clerk. The Iowa Engineering Co., Clinton, Ia., are consulting engineers.

Lexington, Ky.—Resolution has been adopted for construction of sanitary sewer on Campsie place.

Shreveport, La.—Task of surveying and mapping route of proposed sanitary sewer system designed to accommodate outlying residence districts of city has been completed by city engineer and estimate of cost of construction will shortly be taken up. Route as mapped out calls for 21 miles of pipe, which includes both mains and laterals, and a tunnel 1,500 feet long beneath Virginia place in Queensborough.

Manchester, Mass.—It has been voted to install sewerage system at estimated expense of $225,000.

Flint, Mich.—Resolution is being considered for construction of sewer on Young St., including manholes, catchbasins, etc.

Saginaw, Mich.—Board of Public Wks. has decided to ask proposals for constructing new sewers at estimated cost of $11,444.47 east and $6,777.91 west, latter including sewer in Stark St., between Irving and Cooper.

Salisbury, Mo.—Meredith Co., 111 Wightman Building, Moberly, Mo., is preparing plans for construction of sewage disposal plant.

Butte, Mont.—Petitions have been received for construction of various sewers.

Butte, Mont.—It has been decided to reject bids for construction of sanitary sewer on Platinum street between Bennett and Western avenue, and this will be re-advertised.

Manchester, N. H.—Resolution for issue of $100,000 of municipal sewer and street bonds has been passed by Council.

Camden, N. J.—Ordinance has been passed authorizing construction of sewers, culverts or drains in and along Jackson st., from Louis st. to Norris st; Mickle st., from 27th st. to 30th st; Carman st. to 30th st., and Morgan st., from Seventh st. to Eighth st.

Newark, N. J.—Resolution has been adopted for construction of system of sewers in various streets. M. R. Sherrerd is Chief Engineer.

Perth Amboy, N. J.—Request has been made for 12-in. sewer in Gadek place to extend 100 ft. north from Pulaski ave. and connect with trunk sewer at that point.

Perth Amboy, N. J.—Resolutions have been adopted to give notice of intention for following improvements: A sewer in Neville street, between Cornell and Groom streets; a 12-inch sewer in Paterson street, between First and Second streets; a 15-inch sewer in Convery place between New Brunswick and Sayre avenues, and a 10-inch sewer in Carson avenue, between Brace avenue and Harrington streets.

Passaic, N. J.—The six weeks' delay in awarding contract on outlet section of Passaic Valley sewer project, brought about by temporary injunction dismissed only two days ago, will possibly raise cost of finishing work by about $170,000 and furthermore delay it by about a year. Degnon Contracting Co., of New York, to whom contract was to be awarded for $18,000 has notified sewerage commission that they have withdrawn from the contract. Next lowest bid was from Merritt & Chapman Wrecking Co., for $486,000. Under circumstances commission has decided not to make any award from present bids, but to advertise for new bids.

Trenton, N. J.—Rules for submission of designs for sewage systems and water supply and purification systems have just been promulgated by State Board of Health. Included in plans for complete sewerage and sewage disposal system there must be map of district, pro-